# GAS JOURNAL, MARCH 20, 1940

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## Editorial Notes

### Value of Advertising

SEVERAL aspects of world trade in a continuing state of emergency were commented on in singularly acute fashion last week by Lord Luke, when he gave his speech to shareholders of Bovril, Ltd., of which beef-essence firm he is chairman. Now we do not intend to discuss—we do not feel ourselves capable of discussing—the merits of "Bovril" as an antidote to mental and physical war *malaise*. But we would like to thank that undertaking for the fun it has provided for us during the past six and a half months on our railway journeys. Our appetite has been whetted by the neatly phrased "Bovril" witticisms; temporarily we have forgotten bureaucratic restrictions. We have looked ahead to more "Bovril" "statements," and, strangely enough, in spite of Hitler, "Bovril" has been, not necessarily foremost, but always, in our mind.

At the outset of war Bovril, Ltd., adopted a keen and courageous advertising policy—courageous because it was not deterred by circumstances; keen because it was peace-inspired. We are now going to quote from Lord Luke's Address: "In the first few weeks of war a great deal of advertising was cancelled. . . . In at least one national daily newspaper the advertising space for September was less than half of the total for the same period the previous year. Within a few weeks many of the advertisers realized they had been a little—shall I say—hasty in making their decisions. . . . During this period Bovril advertising, I am happy to say, continued without a break." And other advertisers, he went on to say, whether or not they had adequate stocks of goods, still had their goodwill to safeguard.

We maintain that goodwill is of primary importance. The gaining of it takes effort. Since the cessation of hostilities in the Great War the Gas Industry had built up quite a deal of goodwill. In this present war the Industry's policy appeared at the start to be to forget about goodwill for itself.

"E.D.A. Keeps at It" is a sub-heading from the leader notes of the *Electrical Review* of March 15. The Electrical Development Association is "keeping at it." We quote from that journal: "We expect to hear that in spite of the war it [*i.e.*, E.D.A.] is continuing to keep electricity well before the general public and particular sections of it. The latest example of popular advertising, a display appearing in the newspapers, puts over a good point—the advantage of the electric fire in the uncertain period between the end of winter and the beginning of spring. This is the time when the housewife looks forward to the discontinuance of coal fires but daren't let them go because of the chilly morn and dewy eve."

Here, then, is clear indication of the intentions of the electricity industry, and it would surely be unwise for the Gas Industry not to make its claims known and inform the public by well balanced propaganda how it, too, has an excellent solution to the problem of providing labour-free comfort for "chilly morn and dewy eve." The Industry is well equipped in every direction to meet the requirements of such demand, and, in fact, with the introduction of attractive tariffs many gas undertakings were getting into their stride in this direction. The blow came on Sept. 3, 1939, and positive action within the Industry virtually ceased. It ceased as far as its publicity was concerned and it is only recently that some measure of advertising has been resumed.

### Keeping Going

GLANCING through *The Times* last Saturday we were impressed with the prominence given by that newspaper to the development of electricity. The British Electrical Development Association celebrated its coming-of-age on March 15. No fewer than 500 guests attended this noteworthy event at a luncheon at the Savoy Hotel, and the Parliamentary Secretary to the Ministry of Transport explained to those present that electricity was playing a vital part in the national war effort—in the production of aeroplanes, rifles, guns, shells, and food. We do not for one moment doubt that our sister industry electricity is playing a vital part in the national war effort, and we in no way grudge it its activities and success. The Gas Industry, too, however, is playing a vital part and recent advertisements have contained the announcement that we are supplying the raw material, toluene, for explosives. That is not the sum of its effort, however. It is supplying precision heat, precision atmosphere control, for furnaces in which metals are being fabricated into war instruments and machines. It is occupied in making from raw coal essential materials for the bonding of roads and the fertilization of crops. We regard it as a great chemical-engineering industry,

and we are not amiss in thinking thus. The Industry, we feel, will be wrong if it does not, by continued publicity—publicity on a broad basis; we need breadth of publicity—make these facts more generally recognized and more widely understood. The Gas Industry should not regard itself as being temporarily closed down. Does the Industry believe in itself? Forthcoming advertisements issued on behalf of the Industry may, we hope, provide an effective and assuring answer to this question. Certain it is that the Industry cannot afford to drift.

## Looking Ahead

We publish in our issue to-day our report of an Address given by Mr. W. L. Boon, General Manager of the London and Counties Coke Association, at a joint meeting last week of the Coke Salesmen's Circle and the Coke Distributors' Salesmen's Circle. We regard Mr. Boon's Address as an important statement. He knows, as we do, that the revenue from coke—provided it is prepared properly and well sold—gives gas an unassailable advantage over some forms of heat production and utilization.

Sized coke, reasonably prepared, can, we are sure, find a market far beyond the sales of 1939. We have watched over recent years the public's reactions towards that admittedly abrasive fuel; and we can say that though its ash content is at times seemingly great, the heat service to be had from it—and housewives do not disagree with us—is comforting to the entire house. Gas and coke are admirable complementary fuels, and will remain so at any rate for the "duration."

We must look ahead, and think of next winter and consider particularly the question of coke deliveries. At the moment lucky people may be able to obtain coke in lots of 224 lb. at inordinately long intervals. This, presumably, puts some strain on transport arrangements and cannot be in the least economic. The while the use of compressed gas for motor transport is being discussed within the Gas Industry. Compressed gas includes "secret methane," which is *sub judice*. Professor Fritz Frank, head of the technical-scientific department for the provision of lubricating and fuel oils in the German War Office during the last war, to whose observation we refer elsewhere in this issue, suggests that the production of liquefied methane need not be regarded as a special secret which should be carefully guarded in this country.

What, then, ought we to do to ameliorate the coke shortage situation which has arisen, and prepare for next winter's demands? The answer would appear to be to carbonize more coal, stock coal, and stock coke, but the all-important factor is to have coal to carbonize and gas and coke to sell in the winter of 1940-41. Perhaps the less coke we are forced to gasify, the cheaper the gaseous therm, and it must be borne in mind that gas oil is an imported product, and that the more self-sufficient the Gas Industry can become the better in times such as these. Planning in wartime is no less important than planning in peacetime, and there can be no doubt, as Mr. Boon asserts, that the time to plan ahead for the regulation of the coke market and to obviate difficulties during war, and probable difficulties in the post-war period, is now. A more imaginative and more rational fuel policy is essential, and in this regard Mr. Boon's Address is helpful and constructive.

## Popularity and Progress

The position revealed by the proceedings at the annual meeting of the Sheffield and District Gas Company, as recorded on pages 590 and 593 of last week's issue of the "Journal," must have been as gratifying to the proprietors as it should be encouraging to the Gas Industry in general. Undoubtedly, the peculiar circumstances of to-day must have presented special opportunities, but it is the foresight and enterprise of the Sheffield Gas Company's administration that has permitted the fullest advantage to be taken of them. Local industrialists are, indeed, under a debt of gratitude to the Company for the completeness of their well-devised plans to provide a fuel service which will occupy a permanent, and a prominent, place among the achievements of the City of Sheffield and of the Gas Industry.

The Chairman, Lieut.-Col. Sir H. K. Stephenson, emphasized the large extent to which the policy adopted by the Company in 1931 of linking-up the coking plants in South Yorkshire and utilizing their surplus gas has contributed to the satisfactory results which he was able to announce. In fact, the South Yorkshire gas grid scheme, which was inaugurated by the Company on the recommendation of the Area Gas Supply Committee, has proved an unqualified success. During the past year the larger demands of industry more than offset the decrease in consumption of gas for domestic purposes and public lighting, with the result that the sales totalled 12,265 million cu.ft.—an increase of 1,547 millions, or close upon 14½%, on the preceding year. The great demands for industrial purposes made it necessary to manufacture larger quantities of gas at the works to supplement the supply of coke-oven gas, in spite of the fact that the supplies of the latter were in excess of previous years. The cost of this gas considerably exceeded that of the coke-oven gas, though the increased price of coal automatically raised that of coke-oven gas under the agreements with the coke-oven owners. Beyond an advance in the price of industrial gas by an amount equivalent to the increased cost of coke-oven gas, there has been no rise in price to consumers.

In the course of the meeting, Mr. Ralph Halkett pointed out that twenty-one years had elapsed since he went to Sheffield as General Manager to the Company. At that time the limits of supply included only a comparatively small area outside the Sheffield city boundary, and the annual output of gas was just over 4,000 million cu.ft., whereas to-day the Company are sending out three times this amount. During this time an energetic policy of expansion has been pursued, so that to-day the area of supply stretches considerably beyond the city boundaries. In fact, it extends as far north as Barnsley, and as far south as Matlock and Matlock Bath. Up to the present some nine undertakings have been taken over, and it might be rash to assume that a limit has yet been set to the Company's activities in this connexion. Statistics were quoted by Mr. Halkett which he rightly claimed to be an indication—indeed, they constituted a very emphatic indication—of the popularity of gas as a fuel, particularly for the steel industry. During the last eight or nine years remarkable increases in consumption have been recorded. This is the period over which the Company have been steadily bringing the South Yorkshire coke-oven gas grid to completion. "It is without doubt," said Mr. Halkett, "due to the Company's successful operation of the grid that we are able to show such a remarkable series of increases, and, further, that the industrial consumers in the area served by the Company are able to enjoy the benefits of the abundant supply of cheap gaseous fuel which the grid provides."

Some idea of the diversity of the Company's operations during the year may be gathered from the statement of the Chairman that about 10 miles of high-pressure steel mains were laid; upwards of 5,000 new services were connected; important contracts have been carried out for public authorities, schools, and private firms, while co-operation with architects and builders has resulted in the installation of gas in various forms on new properties; an order was received for a furnace for continuous annealing, with a heating chamber 110 ft. long by 3½ ft. wide, capable of annealing at the rate of 6 tons per hour; two new compressors have been installed; and additions have been made to the gas producing plant. Altogether Sheffield provides an inspiring story, illustrating the popularity and progress of gas, in an area mainly devoted to vital industries.

## Alternative Motor Fuels

Further contributions to the discussion on the recent Paper by Dr. C. M. Walter on "Alternative Motor Fuels" ("JOURNAL" for March 6), have now been published in the Journal of the Royal Society of Arts. In one of the communications, as mentioned previously in our issue to-day, the view was expressed that the production of liquefied methane for use as motor fuel need not be regarded as a special secret which should be carefully guarded in this country—that the process was available in Germany.

Another communication was from Mr. W. Hamilton Martin, who referred to the formation some time ago of a British Company which has been developing a type of wire-wound mild-steel lightweight gas container to the same specification as those now made and used in France. The method of their manufacture, he wrote, is much simpler, quicker, and less costly than that demanded by the solid-drawn containers of alloy steels. When subjected to destruction tests, by the application of internal pressure, they do not burst but collapse harmlessly. Details of these cylinders will be found on a later page.

## Basic Petrol Ration

We have had occasion to comment in these columns on the withdrawal of basic petrol allowances when lorries have been converted from petrol to gas. The matter is referred to in the report which we publish in to-day's "JOURNAL" of this month's meeting of the Central Executive Board of the National Gas Council. It will be seen that the Council's efforts to obtain concessions in regard to the retention of the basic petrol ration have at any rate been partially successful. The Ministry of Transport has now conceded that the basic ration for vehicles converted to gas propulsion shall be half the normal ration. The arrangement will apply for a period of six months, and the subject will be reviewed before the end of next August. Supplementary rations will be issuable to converted motor vehicles provided the work done is "essential and not capable of performance on the alternative fuel."

# Personal

The EARL OF DUDLEY has been elected a Director of the Wolverhampton Gas Company.

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Mr. L. G. MILLS, of Newhaven, has been appointed Engineer and Manager of the Sandwich Corporation Gas Undertaking. He succeeds Mr. J. Giles, who is retiring after many years in the service of the Council.

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At a special meeting of the Dartmouth Town Council on March 14, Mr. J. B. CATTLE (Managing Director and Secretary of the Dartmouth Gas, Coke, and Coal Company) was elected by ballot to a vacancy on the Council.

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Mr. HAROLD E. BENNET, M.C., has the distinction of having been elected Captain of the Royal Automobile Golf Club for the second year in succession. At the Club's largely attended Annual Dinner at Woodcote Park he made a presentation on behalf of the members to Mr. W. M. Watt, who has completed 25 years as the Club's professional.

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The wedding took place at St. David's Church, Neath, on March 14, of Mr. Darrell W. Rees and Miss Elizabeth Parker, of Neath. Mr. Rees was recently appointed Engineer and Manager to the Pembroke District Gas Company, Pembroke Dock, previous to which appointment he was Assistant Engineer to the Neath Corporation Gas Department.

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Mr. E. W. BRIDGES, Manager of the London Offices and Showrooms of John Wright & Co., Ltd., will be retiring on March 31 next after fifty years with the Company—a record of service of which he may well be proud and which must now afford him many happy memories. Mr. Bridges' many friends in the Industry will be glad to know that despite his retirement he will yet be available in a consultative capacity, wherein his long experience will be of great value.

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Mr. HENRY DIXON, of Conway, has retired on superannuation from the service of the Conway Corporation. He served in the Gas Department as Manager thirty-one years. The staff, when Mr. Dixon started, was one man and the Manager, and the output 4 million cu.ft. per annum. When he left in 1931 the yearly output was 57 million cu.ft. Since leaving the gas-works in 1931, Mr. Dixon has served nine-and-a-half years with the Conway Bridge Commissioners. Altogether he has had over forty years with the Conway Corporation. A native of Bridlington, Mr. Dixon served a seven years' apprenticeship with the Bridlington Gas Company.

# Government Plans for Stacking Coal

The Prime Minister, replying last week to a deputation on the coal scarcity in Greater London and the South of England, said the Government fully realized that a serious shortage existed in these areas. Even given good weather, it was not to be expected that the shortage could be overcome until after the end of the present month. He hoped that thereafter the situation would be greatly improved and that it would be possible to begin to build up reserves for the future. In order to provide for this, plans for the stacking of coal and other measures were being made. The deputation was from the London Workers' War Vigilance Committee.

# Obituary

Mr. GEORGE B. PLUNKETT, a Director of the old Tonbridge Gas Company, died on March 4, aged 73.

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The death has taken place at Stanley (Co. Durham) of Mr. J. M. FORREST, Manager for 25 years of the Stanley Gas Company. He was 70 years old and retired two years ago.

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The death has taken place of Mr. D. P. FELLOWS, head of a firm of coal merchants, of West Hogley, Stourbridge, at the age of 78. He became a Director of Rowley Regis Gas Company more than 35 years ago, and had been Chairman for more than 30 years.

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Mr. WILLIAM JAMES SMITH, who was Gas Engineer and Manager at Bolton until his retirement two years ago, has died at the age of 67. Mr. Smith succeeded his father as head of the Gas Department in 1909, after serving for three years as assistant at Carlisle. He was President of the Manchester and District Association of Gas Engineers in 1930. His son, Mr. P. Smith, is at present Assistant Gas Engineer at Rochdale.

# Forthcoming Engagements

**March**

**29.—Manchester Association.**—Meeting at Manchester. Presidential Address of T. Reynolds.

**30.—Manchester and District Juniors.**—Meeting at Bolton. Paper by N. Matthews, "Operations and Efficiency in Vertical Retorts."

**30.—Yorkshire Juniors.**—Meeting at Leeds. Paper by L. W. Roberts, "Some Experiences of the Laying of the West Yorkshire Gas Grid." Also visit to Meadow Lane Gas-Works.

**April**

**2.—Gas Research Board.**—Emergency Panel of Council, 10.30 a.m.; Finance Committee, 12 noon; Council, 2.30 p.m.

**5.—North British Association.**—General Meeting at Glasgow. Papers by D. D. Melvin (Edinburgh) and T. S. Lockhart (Rothesay).

**9.—N.G.C.**—Central Executive Board, 2.30 p.m.

**9.—I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; Benevolent Fund Committee of Management, 3 p.m.

**10.—I.G.E.**—Board of Examiners, 10.30 p.m.

**11.—S.B.G.I.**—Emergency Committee, 56, Victoria Street, S.W.1, 2.30 p.m.

**16.—I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2 p.m.

**19.—I.G.E.**—Chairmen's Technical Committee, 2.30 p.m.

**20.—Yorkshire Juniors.**—Short Paper Meeting.

**27.—Manchester and District Juniors.**—Meeting at Stretford. Papers by J. C. Hogg on "Carbonizing of Stock Coal," and by H. Q. Marris on "Sales of Appliances in Wartime."

**May**

**3.—North of England Association.**—Annual Meeting at Newcastle.

**6.—I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.

**7.—N.G.C.**—Central Executive Board, 2.30 p.m.

**7.—I.G.E.**—Council, 10 a.m.

# Letters to the Editor

## "Modern Gas Storage"

SIR,—I think that many of your readers must have felt somewhat disappointed on reading Mr. S. C. Thomson's Paper on "Modern Gas Storage," an extract of which appeared in your issue of March 6. They might well have imagined from the title of the Paper that he would review fully and impartially the principal features of all types of modern gasholders—column-guided, spherical, spiral, and waterless—but Mr. Thomson, after a very brief mention of the former types and what *he* considers to be their disadvantages, devotes his attention almost exclusively to extolling one particular type of waterless gasholder. One would assume he is aware that the water-sealed gasholder, especially of the spiral type, is still predominantly favoured in this country for coal gas storage, also that the M.A.N. is by no means the only waterless gasholder available.

Although Mr. Thomson makes a passing reference to the Klönne waterless, and concedes that the basic ideas and advantages of the M.A.N. and Klönne are alike, he states:

"Here the similarity ends, for while the M.A.N. Company concentrated upon a design giving a polygonal shape to the cylinder and piston, and used a liquid seal, the Klönne Company designed a gasholder having a circular cylinder and piston, and relied upon a dry seal."

The remainder of Mr. Thomson's disquisition is mainly a detailed description, eulogistically expressed, of an M.A.N. waterless gasholder of moderate dimensions, and the restricted range of his treatise certainly does not, in my opinion, justify the somewhat ambitious title of "Modern Gas Storage."

As Mr. Thomson has made the M.A.N. waterless so prominent a feature of his Paper and practically ignored its competitor, the Klönne waterless, I think a few contrasting points may be of interest to your readers, especially as the Klönne waterless gasholder, although a more recent introduction, has made very rapid advancement and appears to be outstripping its older rival. The largest gasholder in the world, of the enormous capacity of 21 million cu.ft., is a Klönne, and many of large capacity have been installed, chiefly for coke oven purposes, in this country and the United States of America, as well as in numerous places on the Continent. The polygonal shape of the M.A.N. cylinder and piston which Mr. Thomson seems so much to admire can hardly be considered the best form for a vessel primarily intended to resist an internal pressure; and in regard to the liquid seal, the canvas or cloth fabric in which this is held is necessarily of a somewhat perishable nature, and in the event of rupture the seal is lost and gas can pass freely into the chamber above the disc. If such a disaster should happen at any time, the attendant dangers are obvious.

The seal of the Klönne is not actually a dry seal, as the piston ring is lubricated and in its travel automatically coats the inside surface of the cylinder with grease and protects it from corrosion, in a similar manner to that claimed by Mr. Thomson for the tar seal of the M.A.N. type.

In my opinion, Mr. Thomson's comments on the cost of foundations, painting, and general upkeep of the waterless type of gasholder, as compared with water-sealed spiral gasholders, requires qualification in favour of the latter.

The trend of present-day opinion is, however, distinctly in favour of water-sealed spirals for town gas purposes, and waterless for coke oven or blast furnace purposes, and the useful discussion that followed upon the reading of Mr. Thomson's Paper very clearly indicated that his listeners were not inclined to agree that only one type of "Modern Gas Storage" was deserving of the high commendation he had bestowed upon it.

Yours, &c.,
R. J. MILBOURNE.

Wellington, Shropshire.
*March* 13, 1940.

## Wartime Street Lighting

SIR,—I have read with much interest Mr. Greaves' letter in your issue of March 13 on the subject of wartime street lighting.

Opinions in various parts of the country differ considerably. In fact, I have on my desk a large selection of Press cuttings, about half of which condemn and the remainder approve the new "starlights." I suggest that this wide divergence of opinion may have depended on the state of the heavens (and atmosphere) at the time the restricted lighting was installed. A gas undertaking unfortunate enough to start the new lighting on a clear night with, say, a half moon or more, would be faced with severe criticism which will probably persist, while another undertaking using the same equipment at similar height and spacing but lucky enough to start the scheme on a moonless night with clouds overhead would receive the blessing of pedestrians and local motorists.

That the new lighting has some value some of the time is one of the blessings for which we ought to be thankful.

As one who has, perforce, to do a fair amount of travelling at night by road on two or four wheels I would like to make a special plea for better lighting at important pedestrian crossings and road junctions. Surely it would not be impossible to evolve a scheme whereby these points could be much better illuminated except during periods of alarm, and on receipt of the necessary information by the local A.R.P. office the district wardens could quickly extinguish these few lamps by hand, without the need for an expensive central control system.

The danger to pedestrians and motorists alike is so great, even with "starlighting," at many key points that it would appear undoubtedly worth while to study possibilities in this direction further and even to carry out experiments in "safe" areas.

Yours, &c.,
The Horstmann Gear Co., Ltd.,
JOHN H. G. HORSTMANN,

Newbridge Works, Bath.
*March* 15, 1940.

## Ice in Gasholder Tanks

SIR,—Owing to my absence from home this week, I have been unable to send in a reply to Dr. Foxwell's comments, but I shall be very pleased to enter into a discussion on the various points he raises, and hope to let you have my remarks in time for publication in the "JOURNAL" in Easter week.

Yours, &c.,
S. M. MILBOURNE.

Wellington, Shropshire.
*March* 16, 1940.

## N.G.C. Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, 1, Grosvenor Place, S.W.1, on Tuesday, March 12. In the absence of Sir David Milne-Watson, the Chair was taken by Mr. Frank H. Jones, M.Inst.C.E., M.I.Mech.E., J. P. (Vice-Chairman).

**Demurrage.**—It was reported that no acknowledgment had yet been received from the Ministry of Transport of the letters addressed to them in February by the Conjoint Conference of Public Utility Associations urging that outstanding demurrage charges should be cancelled and that the Railways (Demurrage Charges) Order, 1939, should be amended.

**Coal Supplies.**—It was reported that the Council had despatched a questionnaire to all gas undertakings, in conformity with an arrangement made by the Conjoint Conference and the Mines Department.

**Committees of Investigation and Central Appeal Tribunal.**—It was reported that the representations of the Conjoint Conference of Public Utility Associations had met with a refusal from the Mines Department to set up any Body or Tribunal to which undertakers could appeal as of right in connexion with any complaint or grievance which they might have.

It was stated that the question of compensation for any undertaking that suffered war damage had been considered that morning by the Urgency Committee of the Council, when it had been decided to recommend that a deputation from the Conjoint Conference of Public Utility Associations should wait upon the Treasury to find out in the first instance the Government's intentions.

**Income-tax.**—The successful result of the Council's negotiations with the Inland Revenue were reported with regard to—(a) Section 15 of the Finance Act, 1937, and (b) Depreciation Agreement, and a hearty vote of thanks was passed to the Council's Income-Tax Committee and its Chairman (Mr. Tagg) for their valuable work in this connexion.

It was stated that a Report had been circulated to the members of the Board, showing the steps taken by the Council with the object of safeguarding the position of public utility undertakers in the London Rating Area. The amendment referred to in the Report in question had been incorporated in the Bill, and although not quite as comprehensive as could have been desired, it certainly did improve the position of Public Utility Undertakers in London.

**War Risks Insurance Act, 1939.**—It was agreed that the Council should make representations to the appropriate Government Department that undertakers who had paid premiums in respect of certain commodities such as coal, coke, and gas oil, which had since the war been declared to be uninsurable against war risks, should be entitled to recover the premiums which they had paid.

It was reported that, as a result of the Council's efforts to obtain certain concessions in connexion with the retention of the basic petrol ration where gas was used as a means of propulsion, the Ministry of Transport had now conceded that the basic petrol ration in such cases should be one-half of the normal basic ration.

# News of the Week

**At Important Points** in the town the Stalybridge Lighting Committee have decided to adapt 36 lamps each of gas and electricity to the new "starlight" illumination. This decision was reached after an inspection of a trial installation in the Borough.

**The Following Schoolboy Howler** has been sent to us by Mr. H. J. Toogood, with the comment that evidently the younger generation is growing gas-conscious: "Sir Thomas More was a famous man. He has just been carbonized by the Roman Catholics."

**For the Cleaning** and general maintenance of gas lamps, so that there shall be no deterioration during the period they are not in use as a result of the blackout, the Broadstairs Urban District Council have agreed to pay the Broadstairs Gas Company £79 4s. per annum.

**The Lecture Hall** of the Taunton Gas Company was placed at the disposal of Miss Janet Bond, the well-known broadcaster and chief of the Canned Foods Advisory Bureau, when she visited Taunton on March 18 and 19 to give suggestions for wartime dishes and to discuss domestic problems with housewives.

**The Draft Special Order** of the Sheffield and District Gas Company under the Gas Undertakings Acts, 1920-1934, has been presented to both Houses of Parliament for approval. It provides for the confirmation of the transfer to the Company of the Eckington and Killamarsh gas undertakings and also of the Baslow undertaking.

**To Authorize** the creation and issue of debenture stock not exceeding 75% of the paid-up share capital, to permit borrowing on mortgage of the undertaking, and to modify certain provisions of previous Acts, the Hampton Court Gas Company intend to apply to the Board of Trade for a Special Order under Section I of the Gas Undertakings Act, 1929.

**An 80-ft. Chimney Stack,** weighing 120 tons, fell at Coatbridge, Lanarkshire, in August, 1938, fracturing a gas main, and a tenement house was set on fire. At Edinburgh Court of Sessions, on March 14, 1940, seven families who lived in the house were awarded a total of £3,327 against the Scottish Iron & Steel Company and the Coatbridge Town Council.

**A Successful Series** of cookery demonstrations featuring "Wartime Cooking Economy," was held by the Southampton Gaslight & Coke Company at their Winchester Showrooms, from March 4 to March 8. The demonstrations were well attended, and great interest was shown in the streamlined "Newhome," cookers used for the demonstrations, which were given by Miss E. D. Newberry, of Stoves, Ltd.

**In regard to** his remarks during the discussion on Mr. Clayton Thomson's Paper on "Modern Gas Storage" to the Institute of Fuel ("JOURNAL," March 6, p. 523) Mr. L. Silver, of the Gas Light and Coke Company, writes to explain that there was an error in the manuscript he handed to the Press. He referred to a schedule fixing a maximum viscosity for the sealing medium in waterless gasholders based, among other factors, on the "maximum" temperature to be expected. "Maximum" should read "minimum."

**The Accounts for the Past Year** of Rawlplug, Ltd., show a profit of £62,060 compared with £59,447 in the previous year. After making deduction for income-tax and other charges and writing off A.R.P. expenditure, it is proposed to pay a final dividend of 30%, making 40% for the year (same), transfer £4,953 to reserve, and carry forward the sum of £25,152, as compared with £22,244 brought in. The Board have written off, out of profits, the whole of their trading accounts with German subsidiaries.

**The Success** of the new "Permutit Hydrogen Ion Process" was referred to by Mr. J. W. Murray, the Chairman, at the Annual General Meeting of the Permutit Co., Ltd. He stated that many further important installations had been made of the system, which was regarded as having revolutionized the whole field of water treatment. Commenting upon the excellent results of the past year's working and the present satisfactory position of the Company, the Chairman paid tribute to the sound judgment and foresight of the Managing Director, Mr. R. T. Pemberton, to whom they were indebted for the energy and care with which he had, under very difficult conditions, consistently promoted and safeguarded the Company's interests.

**The West-End Offices** of G. A. Harvey & Co. (London), Ltd., at 58, Victoria Street, S.W.1 ('phone VICtoria 4963), have now been re-opened.

**Stockton-on-Tees Town Council** has adopted a revised scale of gas charges showing an increase of 10% for all consumers from the March meter readings. The increase amounts to 4d. per 1,000 cu.ft.

**The Principal Provision** of a Special Order for which the Cardigan and Fishguard Gas Company intend to apply to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934, concerns the transfer to the Company of the gas undertaking of the Fishguard and Goodwick Urban District Council, together with a re-definition of the new area of supply.

**The Institution of Chemical Engineers** will hold their 18th annual corporate meeting, and also an extraordinary meeting, on Friday, April 5, at the Hotel Victoria, W.C.2. The proceedings will begin at 11 a.m., and the subject of the Presidential Address by Mr. F. Heron Rogers will be "Oil." A luncheon has been arranged to follow the meeting (tickets 7s. 6d., exclusive of wines).

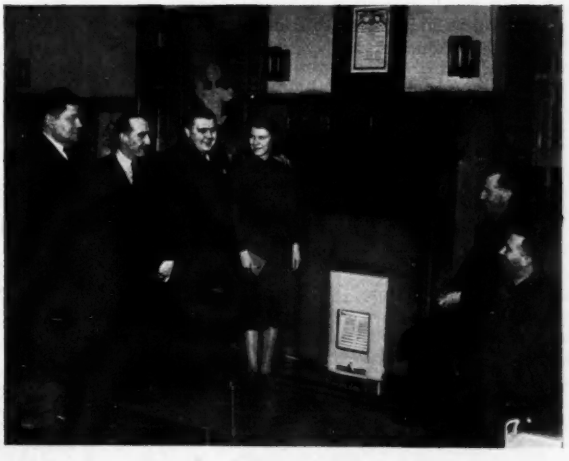
## Manchester District Association

### Annual Meeting

Details are now available of the 70th Annual Meeting of the Association, which is to be held at the Midland Hotel, Manchester, on Friday, March 29. The Annual Luncheon will take place at 1 p.m., and the meeting will assemble at 2.30 with Mr. H. Singleton (Huddersfield), the President, in the chair. After transaction of the usual business, Mr. T. Reynolds (Stockport) will be inducted to the Presidency for the succeeding year, and will give his Presidential Address.

An interesting note on the agenda informs members that Messrs. R. & J. Dempster, Ltd., have presented to the Manchester Public Libraries bound volumes of the Transactions of The Institution of Gas Engineers from its inauguration in 1865 to 1902. The volumes are available for reference at the Manchester Central Library.

## Film Star Visits Gas Showroom



*When the film "Where's That Fire?" was being shown at the Gloucester Hippodrome and Graham Moffat, one of the stars, visited the city, he paid a call at the gas showrooms where the Gloucester Gas Light Company had a window display linking up with some Radiation fires. Grouped beside the new "Silent Beam" model, we see with Graham Moffat (left to right) Mr. A. L. Morris (Commercial Manager), Mr. W. G. Bowen (Showroom Manager), Miss A. H. James, Mr. E. C. Rogers (Manager of the Hippodrome), and Mr. W. A. Chard (Distribution Manager).*

## Lightweight Gas Containers

### Wirewound Cylinders for Motor Transport

In a written communication to the discussion on Dr. C. M. Walter's Paper on "Alternative Motor Fuels," Mr. W. Hamilton Martin gave details of wirewound cylinders being developed by a British Company.

The overall length is 8 ft.; diameter 10 in.; weight empty 245 lb., water capacity 224 lb.; working pressure 3,000 lb. per sq. in.; test pressure 5,000 lb. per sq. in.; collapsing pressure 7,500 lb. per sq. in. (approx.); and gas capacity at 3,000 lb. sq. in. pressure about 700 cu.ft.

The method of their manufacture, he stated, is much simpler, quicker and less costly than that demanded by the solid drawn containers of alloy-steels. The latter need most careful treatment to avoid early embrittlement in service.

These wire-wound containers consist of two half mild steel shells, like the pods of beans, which are welded together along their edges, their ends being of ogival shape and their parallel cylindrical part being covered by a layer of multi-start high tensile steel wiring. They are as light as, or lighter than, the much more expensive alloy steel drawn containers, while they lend themselves more easily to mass production. These containers, when subjected to destruction tests, by the application of internal pressure, do not burst or break up in such a way as to cause danger to their surroundings, but collapse in a perfectly harmless manner. What actually happens is that the welded shells, being constrained within the wire windings, begin to extend longitudinally when the yield point of the material is reached, and, in so doing, the parent-material stretches more than the weld-material and that in the weld-zone. This results in the development of fine haircracks in these two latter parts, causing weeping and release of pressure and so preventing any bursting of the container.

## Survey of the National Coal Resources

### The Six-Quarters Seam, Cumberland

In war even more than in peace, our national coal resources are an asset of incalculable value, and it is essential that they should be used to the best advantage. Importance attaches, therefore, to the publication of the latest report dealing with the work of the National Coal Survey being carried out by the Department of Scientific and Industrial Research. The Report deals with the Six-Quarters seam of the Cumberland coalfield (Fuel Research Physical and Chemical Survey of the National Coal Resources No. 49, published H.M. Stationery Office, 2s. net). The work was conducted under the guidance of the Cumberland Survey Committee composed of representatives of the Cumberland Coal Owners' Association, a representative of the Geological Survey of Great Britain, and the Department's Director of Fuel Research.

The Report states that it was estimated in 1905 that the reserves of workable coal in the Cumberland coalfield amounted to nearly 1,528 million tons. This estimate included the rather uncertain amount under the Carlisle Basin, and undersea coal to a distance of five miles from the land. A subsidiary estimate, to include undersea coal for a distance of 12 miles from the land, increased this figure to 2,382 million tons. As the output from the coalfield is about 60 million tons since 1905, the useful life of the field may be reckoned in hundreds of years.

The coal is, in general, strongly caking and the agglutinating values, as measured by the British Standards test, are always high. The coke yields are normal for the rank of the coal, and the yield of gaseous therms averages 73 therms per ton of air-dried coal.

The ash fusion point is fairly constant, the figures obtained in an oxidizing atmosphere ranging from 1,330° C. to over 1,440° C., the majority fusing at, or above, 1,400° C. More variation was noticed in a reducing atmosphere, the figures varying from 1,150° C. to 1,310° C.

Considerable reserves of the seam exist in most of the localities from which samples were taken. In the north, where it is not worked, the general reserves of other seams are ample, and this seam may not be developed for many years. In the extreme south it has not been mined extensively, but the quality is good and it will become of increasing importance in the future.

## Research on the Problems of Water Supply

### New Laboratory Opened

The Department of Scientific and Industrial Research has opened a new Water Pollution Research Laboratory at Watford equipped for work on the problems of water supply, sanitation, and the recovery and utilization of valuable materials from trade effluents of many kinds.

On the outbreak of war plans for building a special research station for work of this nature, which is carried out under the general guidance of the Department's Water Pollution Research Board, were well advanced, but it was decided to postpone them and to secure temporary accommodation to meet the immediate needs of the work which are likely to increase under war conditions. Suitable premises have been obtained, and enquiries and other communications intended for the Director of Water Pollution Research should henceforth be addressed to the Water Pollution Research Laboratory, Langley Road, Watford, Hertfordshire.

An investigation now in progress at a branch laboratory in Birmingham, in co-operation with the Birmingham Tame and Rea District Drainage Board, has already indicated that the capacity of percolating filters for treating sewage can be increased by at least 50%. The capital value of filters of this kind in Great Britain is of the order of several million pounds. In the new method of operating these filters, costs of pumping will be increased, but the possible net saving to the community in the next 30 or 40 years must be assessed in hundreds of thousands of pounds.

In addition to special investigations of the kind already mentioned, assistance has been given in response to numerous enquiries from organizations and individuals by indicating methods of dealing with problems of water supply, sewage disposal, and the treatment and disposal of trade effluents of many kinds.

**A STRIKING WINDOW DISPLAY FROM BOURNEMOUTH**

*This original showroom window display was arranged recently by the Bournemouth Gas and Water Company. It ties up neatly with the "Nocturne" portable heater which is prominently featured, while it will be noticed how little the paper splinter-proof figure and "streamers," gummed to the glass, detract from the effect. If anything, they add to the interest of the window as a whole.*

# The Present Coke Position— and Post-War Outlook

**An Address given at 1, Grosvenor Place on March 13, to a Joint Meeting of the Coke Salesmen's Circle and the Coke Distributors' Salesmen's Circle under the Chairmanship of Mr. W. Daniell, President of the latter Circle.**

By

W. L. BOON,

General Manager of the London and Counties Coke Association

THE position of coke markets at the present time is somewhat confused, as a consequence of war conditions and their effect on fuel supplies. Thus the post-war outlook is shrouded under all manner of unknown conditions which may arise during the war and have their effect afterwards. Whatever views one might form, therefore, as to the post-war fuel position might be so altered by the sequence of events as to be quite misleading and futile.

With our limited experience of this war and the memories of the fuel situation after the last one, we might, nevertheless, be permitted to discuss the pros and cons of the position as we now see it. I should wish to avoid becoming in any sense prophetic; but, in my view, the fuel situation is going to be difficult after the war. Already we have evidence which might justify such a conclusion.

So the sooner we start thinking about things and perhaps planning for the future the better shall we be equipped to tackle the problems which will undoubtedly face us.

We have passed through a difficult time in regard to fuel supplies this winter, and it is not easy to see clearly through the problems which immediately beset us—let alone plan for post-war conditions. I believe that it is precisely because we have not planned in time or planned adequately that much of the difficulty we have experienced has arisen. To put it bluntly, there has been no co-ordinated policy to guide the fuel industry or apparently the Government Departments who have the industry ostensibly under their care. The unusually severe winter has, of course, contributed to the difficulties of the situation, but not to the extent which lack of policy has done. Bearing in mind the conditions which the fuel industry has had to face, it is remarkable that the position has not been more acute.

## Disabilities of Official Control

It is my opinion that if the industry had been given greater freedom from official restriction the affairs of fuel distribution would have been in a much better position than they are now. Under all the disabilities of official control and the multitude of troubles which that brought in its train for all connected with the industry, I think it is a matter for congratulation how all and sundry subordinated their business interests in the common effort of getting supplies to the consumer. Some really heroic work was done, and it is a pity that the community generally should not more fully appreciate the great efforts made on their behalf by all the distributive trade.

It is easy to be wise after the event and to say that prudent planning might have prevented a great deal of the trouble we have experienced. In point of fact, the wisdom of developing a comprehensive fuel policy has been urged for the past ten years by many of the most prominent men of our times. So the question of developing our fuel industry on co-ordinated and progressive lines is nothing new, although its necessity becomes more imperative as time goes on and we see more clearly the dangers of drifting. I firmly believe that the present fuel situation would be essentially better had there been a guiding policy behind the production and utilization of fuel on a national basis.

We are concerned here, however, with the position as it is and not as it might have been—although I think it is relevant for us all to consider what our position would be in the event of the Government determining a national fuel policy, not only for the war period but as a permanent measure. I think we should find an immediate curtailment of the use of raw coal with a corresponding increase in the carbonizing industry. This would follow and accelerate the peacetime trend of fuel development because of the vital need at this time for the by-products of the process. Again, on the economic side the value to the Nation of a ton of coal is just doubled by carbonizing it. These are just fundamental facts, and their acceptance is not in question. The only question is one of time. When shall we see them brought into force by legislation?

## A Process of Change

The process of change is going forward already. The ordinary law of economics is working to that end. The trend of public opinion is working to that end—and the progress of fuel utilization is pulling in the same direction. In these circumstances, is it not wise to consider the position of carbonized fuels in relation to one's own business outlook? Then, at least, one can determine one's own business policy, however lacking the official outlook may be in that respect. If I were asked to give points for the consideration of framing future policy I would say something like this to the various sections of the industry:

To the Gas Undertakings: Look to the question of improving your coke quality and increasing its output and to maintaining uniformity of product. Be interested in the utilization of your product and help towards its more effective application. Co-operate with your distributors to achieve the satisfaction of the consumer.

To the Furnace Coke Producer: I would give the same recommendations but would add: Be determined to maintain stable markets. Keep your price at an economic level. Resist peaks and valleys as being bad business.

To the Merchant: Are you developing coke business? If not, would it not be in your interest to do so? Ask yourself where is public trend leading and what direction of fuel utilization could you with advantage follow? Is coke business more difficult than coal? Is it as profitable, taking the long view? What help do you get in your coal business? What help could you get if you go in for coke? Are coal and coke competitive or complementary in your business? Where do you meet most sales resistance?

I would ask myself also—can I do anything now to further my business by making preparation for the future? You might feel that you can plan and prepare, but do little execution until the war ends. I would not agree with this defeatist view. I would not only plan but also execute, and be held only by the limitations with which I am hedged. It is too easy to blame conditions and excuse one's shortcomings by the exigencies and environment of the times.

The salesman, too, may very well assert that policy is not his concern, that he has no voice in the framing of it or in influencing its determination. I would not agree with this view either. The fuel salesman *has* an influence on the policy of his company, although he may have no direct voice in its determination. The policy of an undertaking must and does concern the salesmen closely, so that he must know its implications and designs; otherwise he cannot be an efficient employee. Hence I make no apology for introducing what some might consider a purely executive function into this address. I do so designedly because I regard the term much more widely and because I feel that it so closely touches us all and should therefore be the concern of all.

The Coke Salesmen's Circles are part of the structure of the London and Counties Coke Association and are operated under a definite policy for systematic development clear for all to see. This very meeting is therefore a part of that policy and fulfilling the object which it was designed to do; it is not

by chance, but by design, that we meet here. It is the same with our business outlook. It should be planned and carried out with set design—not ruled by chance and circumstance.

It is true that the conditions imposed by war largely disintegrate peacetime policy and stultify our efforts to plan and develop in the normal way. But, even so, adjustments can be made—in fact, they must be made—if we are to overcome the difficulties of the war period and carry on business. I would say that in spite of unknown conditions ahead we just cannot afford to neglect making preparation for the future and that we should not easily give way to drifting under the rule of circumstance.

We are primarily concerned to-day with the coke situation as we now see it and with the future as we can visualize it, rather than with anything that has passed. It would be well, however, to be reminded of the part which coke has played in the difficult times we have gone through this winter—facts still fresh in our memory. I believe it could be justly claimed that the joint supplies of gas and coke largely saved the fuel situation from an otherwise calamitous position.

### Need for Fuel Stocking

The system of producing and stocking coke at gas-works provided large supplies of fuel at accessible points, and the emergency clearly proved the value to the community of this method of stocking fuel—the one regret being that stocks were not treble the available quantity. The shortage of coal at the point of consumption was, and is, of course, the underlying cause of most of our trouble, and the meagre supplies of coal to the Gas Industry since the war started has necessitated the use of large quantities of coke for water gas production, which was undertaken by official Order and is against the normal policy of the Industry. This factor alone has denuded the markets within the L.C.C.A. area of a substantial tonnage of coke.

On the other hand, and very fortunately for us, the home markets had many thousands of tons made available which normally would have been exported; this therefore helped the markets but did not balance the loss. In the ordinary course of events we should commence to accumulate stocks from the end of March and build up to a total in the area of half a million tons of coke by the end of October. Whether we can achieve this or not for next season depends entirely upon the supplies of coal to the gas undertakings. If coal supplies can be adequately maintained, then we should be hopeful of being able to build up to our normal stock position before the next heating season begins.

I might say at once that the London and Counties Coke Association is doing everything in its power to achieve this. The Industry is entirely opposed, both for its own sake and that of the fuel position as a whole, to using coke on any abnormal scale for water gas production. It is quite obvious, too, that if coke supplies are short it is not good business for the Industry or the merchant. The demand for coke has in fact increased out of peacetime proportions since the war started, and ordinary business prudence would require that this demand should be satisfied if it is at all possible to do so. From all aspects of the case there is every reason to increase our efforts to achieve a greater production and not to suffer any decrease in output.

The position, so far as the Industry itself is concerned, is therefore quite clear; but the fulfilment of its objects is, unfortunately, largely beyond its control. We shall continue to do all that we can to attain the desirable ends in view, but all the effort and goodwill in the world may not suffice to overcome the difficulties which the future may be holding in store.

One thing is obvious—if stocks of fuel are held anywhere they should be as near as possible to the point of consumption. This last winter has given us a sharp reminder on this point, and it seems logical that gas-works should hold their maximum capacity because they are nearer the centres of population than any other equally convenient position. I think we are all aware that the crux of the whole matter is not one of production, but rather of transport. Coal is not short at the pits; it is simply a question of getting it to the point of consumption. It has been stated by the Secretary for Mines that every effort is to be made to accumulate stocks during the coming summer months so that the position should be easier next winter.

I imagine that everyone concerned must have wondered how this is to be achieved. Large stocks cannot just be dumped in fields, and the restrictions put upon merchants for waggon demurrage simply hinders the stock position. The householder can be urged to lay in stocks, and those who are fortunate to have space available will probably be only too willing to do so. But the great bulk of people living in modern houses and flats have no stock room and require frequent service in small quantity. If the Mines Department can fulfil their promise sufficiently to fill available stocking space I shall think ourselves fortunate and the ensuing summer months give the only opportunity for this to be done. The official perception of trade conditions has not proved helpful up to now, and I am sure that their machinery of rationing—which gave us all a headache—could have been provided and its function performed by the trade itself much more efficiently.

Their rationing scheme turned out to be futile and unfair and has done nothing but put burdens on the trade and on the consumer. The trade is struggling to put right, so far as it can, the troubles thus caused; but I believe that forethought and co-operation within the trade itself could have done a lot to obviate the difficulties we have gone through if they had been given thought at an earlier period, so that we are not blameless in this matter.

In any event rationing seems quite unnecessary for the small domestic consumer because he is, in effect, always in a state of ration. His income demands rationing. On the other hand, the large industrial consumer will, from commercial necessity, buy and use his fuel in the most economical way. Those who can remember the last war and the conditions which arose thereafter will recollect the wave of fuel economy which was engendered by the high prices which the war brought about. It was then that the fuel technologist was born—to bring into being more efficient methods of utilizing fuel. Builders of machinery turned their attention to the manufacture of appliances which the fuel technologists required for their purpose. The results were remarkable, and to-day some 30 million tons of coal are saved to the Nation each year by more effective methods and appliances for using fuel for exactly the same proportion of work done.

Efficiency in fuel utilization is therefore the concern of the consumer, although much more can yet be done in the direction of fuel economy. In fact, efficient utilization should be the concern of every fuel salesman and part of his policy for effective business development. I believe that a great deal of the success which has attended the work of the London and Counties Coke Association has been due to the importance which has been attached to that part of its policy which has been directed to the efficient utilization of their product. It has determined by experience that the policy of trying to make one ton do the work of two is good business and a paying proposition.

### Conservation of Fuel Resources

The conservation of our National fuel resources should be the concern of us all. If we agree with this, then efficiency of utilization in all its many forms is the instrument by which it can be achieved. We are well aware that this country's coal resources constitute our greatest natural wealth, and as the race for world commercial supremacy continues we are required more and more to use those resources in the most effective way.

The most effective method yet devised of using coal is to carbonize it. There are no technical, commercial, or economic arguments which can be propounded against this simple fact. I have said already that the public trend is towards using fuels produced by this process—so that one might envisage that war conditions will but strengthen the position of the carbonizing industry, and that post-war conditions will demand still more rigid economy of fuel utilization, which again leads in the direction of carbonization as being the most effective method of coal economy known to science at the present time.

There are people who tell us already that we are out-of-date to consider using solid fuel at all and that the future will be fuel on tap or by switch. I agree that in the ordinary sequence of events progress is leading in that direction; but I do not think it need disturb us, for it is likely to be a long time before such ideal conditions of heating can become

universal. What is true, however, is that the type of solid fuel is changing and that cleaner fuels, mostly of a smokeless nature, will be used. We are beginning an era of using carbonized fuels, and when that ends there will be no solid fuel at all save for purposes of processing as a raw material.

That time, however, is too far ahead to cause us any worry now, but it is significant to note the rapid expansion of the carbonizing industry in recent years. How many, I wonder, will have realized that already one quarter of the total home consumption of coal is now carbonized and that in the space of two decades the domestic market has changed over from coal until now one-fifth is using carbonized fuel.

### The Future

I have tried to outline the position as it faces us to-day. But it is the future outlook which we are perhaps more concerned to discern. If what I have said in regard to the carbonization of fuels is correct, if the economic and other aspects to which I have referred are sound in practice and reasonable in principle, then there is every probability of a move even during the war to increase the carbonization of coal.

After the war therefore we might conceivably have more coke to sell as a result of the policy which war conditions have alone determined. I have tried to indicate also that the framing of such a policy is right as a normal peacetime condition if only from the point of view of conserving our fuel resources. The natural trend in peacetime shows that such a move is taking place, and it is my belief that the war will accelerate it. It is impossible to foresee clearly the position of the fuel industry during the coming year; but if the war continues a policy must be determined of a long-term character to carry us over that period and beyond it.

If I were directly concerned with the selling of fuel I should think it necessary to consider carefully all these points and to determine whether my interest would be well served by improving my sales of carbonized fuels. In my view that is the direction in which future progress lies—not in the sale of raw coal. Looking at the facts sanely and from an unbiased viewpoint, there is nothing which does not point in that direction.

How am I going to sell coke in the future?—is a question you might ask yourselves. The old method of selling fuel on a cut price basis is I think gone for good and rightly so. We must sell on the service our commodity will give—on efficiency of utilization and on economy. The London and Counties Coke Association is, in effect, selling on a large scale—though it is not actually selling or buying anything. Nevertheless, it is selling on the principles I have enumerated—selling the service the commodity can give. It is determining for the consumer the best method of fuel application which can be devised for his particular purpose. The Association is also continuously exploring new fields of heat application in which coke might usefully be employed. The original heat process for grass-drying has been developed, for instance, in all sorts of directions and in many other branches of agriculture and commerce.

As an example of this, the Association drew the attention of the Ministry of Agriculture to the fact that cattle food could be produced by artificial means in this country by a process of drying, which would save considerable importation and transport of foreign food concentrates. This was "selling" in its widest sense. Consider grass-drying, which is now almost an industry in itself and a big consumer of coke; we were largely instrumental in its commercial development because heat is required for the process. There is the motive—and that industry now provides quite a lot of business for many people in this room. Indeed, as a result of our help the Dutch Government are now subsidizing installations of grass-drying plants in Holland—41 of which are now being erected. The Dutch are more awake in this connexion than is perhaps our own Government, who are yet importing foreign cattle food concentrates. The same thing is happening in Belgium.

Again, much has been heard recently about the use of kitchen refuse for manufacturing cattle food. The Association interested itself in this immediately and has developed a coke plant for drying the product before grinding into meal. We have also gone into the question of drying waste potatoes to provide pig food, and into the relative merits of heating pig farrowing sheds. All these are selling points for coke in the future, and if you are cognizant of these applications you will be in a position to sell coke for such purposes.

### Heat Conservation

In the efficient utilization of coke as a space-heating medium the effective insulation of buildings is of the greatest importance. Much heat is wasted through unnecessary loss in this way, and we are turning our attention to ways and means of insulating structures by simple methods. If we can so insulate buildings as to save much of this heat loss we are making a material contribution to fuel conservation.

The Association recently put forward a scheme for a large manufacturing works where the capital cost of insulating the building was almost paid for in the first year by a reduction in the cost of the heating installation itself. The net result is that the consumer will be enabled to heat the premises adequately on half the amount of fuel he would otherwise have had to use. That is another example of the type of selling we must visualize in the future.

We are also continuously interested in new appliances for burning coke—not only in appliances as manufactured, but in improving those appliances for the benefit of the consumer. We have prepared a list of "approved appliances," and no appliance goes on that list until it has been rigorously tested and approved by the Association. Thus we know that nobody can blame the appliance if the coke is not burning properly. And that brings us to the question of coke quality. We have never been complacent in regard to coke quality, and are continually urging higher standards in this direction as part of a sound business policy for the future.

Much has been heard recently about the possibilities of producer gas propulsion for road vehicles, and we have closely studied the possibilities of gas coke as a fuel for the portable producer which the Government have evolved. This producer, however, calls for a very special type of fuel, and no ordinary coke or coal is suitable for the purpose. Only a most reactive fuel can be utilized in producers of this type, and one which is low in ash and practically tar-free. We are experimenting with activated cokes and with the possibilities of producing special coke for this purpose but it is premature to say that they will be successful. If, therefore, you have in mind any projects in this direction, you must realize that the only fuels at present suitable for transport producers are special classes of anthracite—now marketed as "Progasite"—and certain low-temperature carbonized fuels. So it is a fallacy to talk glibly of the potentialities of road transport as being a solid fuel market of any magnitude at the present time. It is quite feasible that it may develop as an emergency method of transport but doubtful whether it will become a permanent method.

It is possible that some new type of producer may be developed which could use a wider range of fuels; but there seems little hope of this in the principle of present-day design.

I am afraid that my outline of conditions and outlook in the coke markets in which we are all interested has been sketchy and indefinite, but it may suffice to focus your attention and assist in dealing with the problems which face us in the future.

Finally I would like to add that the Association is continuing its work of developing new applications for coke and appliances of a suitable type in which to burn it. Unless we suffer any severe setback, the outlook is promising from a utilization point of view, but the immediate future is obviously full of uncertainties.

## Dust Removal

Increasing attention has been paid in recent years to the question of dust removal in industry, and the advantages of installing efficient plant to collect dust the moment it is produced, and before it has time to permeate the surrounding atmosphere, have been realized. The necessity of submitting dust removal problems to experts is stressed in a new booklet on "Dust Removal" (K.189), published by Keith Blackman, Ltd., of Mill Mead Road, Tottenham, whose plants are in use in every dust-producing industry. The booklet shows how each dust exhausting application demands individual calculation as regards hoods or hoppers, conveying pipes, resistance due to pipe friction, air speeds and fan pressure. Several noteworthy plants are illustrated and the booklet includes a list of many important users of "K.B." dust removal plant.

# Dealing with Tar and Ammoniacal Liquor

## From the Presidential Address of the Gas Institute of New Zealand

By
C. H. E. COLLINS
Assistant Engineer and Manager of the Auckland Gas Company

Owing to the laborious and costly method of filling drums and transporting them to the site of the tar-sealing work, emptying them into small portable heating kettles holding some 200 or 300 gallons, usually horse drawn, and then spraying from the kettle on to the roads or paths, this Company initiated some six years ago a hot tar delivery system in its own bulk insulated tanks. We now have a fleet of large motor lorries which carry 600 or 850 gallon insulated tanks equipped with petrol driven rotary pumps complete with spraying hoses and nozzles. To deliver hot tar of the requisite viscosity day after day up to 5,000 gallons is a common occurrence. This system is so popular and efficient that the Town Council tar heating kettles are now a thing of the past, and relegated to the scrap heap. A new record of delivery and spraying of hot "Distar" was made on Saturday, Nov. 4, when we delivered 7,800 gallons to the Papakura Military Camp.

Our hot tar bulk delivery wagons now transport as far afield for the Main Highways Board and contractors as 166 miles, and we have regularly for a week at a time delivered and sprayed on to the roads at this distance over 3,200 gallons per day. When travelling long distances, we allow for a temperature drop of 8° per hour, in the insulated tank, and the hot tar is accordingly loaded into the bulk tanks at the Gas-Works at this higher temperature in order that it arrives at the site of tar-sealing operations at the correct spraying temperature. We find this method of spraying the main highways so speedy and efficient that it is frequently difficult for the road contractor to supply and spread the gritting material.

All tar oils recovered in crude tar distillation are first of all chilled to about 30° F., in specially built freezing chambers; duplicate freezing chambers are provided 16 ft. by 16 ft. by 12 ft., and each contains two tar oil vats 13 ft. by 7 ft. by 2 ft. 6 in., each of about 800 gallons capacity. The whole of the walls, floor, and roof are insulated with diatomaceous bricks. On chilling the tar oil, the naphthalene is deposited in a solid form in the vats, the tar oil, now practically naphthalene free, is then run into storage tanks, while the crude brown naphthalene is discharged from the vats and dumped on to an adjacent draining floor after which it is whizzed, if necessary, prior to being placed in subliming chambers for sublimation.

The tar oils are then subjected to distillation and the crude benzole and middle oils separated; creosote to British Standards Specification A is also manufactured, which finds a ready market for timber preservation purposes.

The whole of the ammoniacal liquor at the Auckland Works is used in the manufacture of anhydrous ammonia; at the Devonport Works the crude ammoniacal liquor is concentrated and transported across the harbour to be further treated in the above plant.

The treatment of ammoniacal liquor is done in two stages —first, the manufacture of pure 880 liquor ammonia, and secondly the manufacture of anhydrous ammonia from the 880. The plant, which is of the continuous type, consists of two large cylindrical cast-iron stills in sections, one being for the liberation of free ammonia and the other for the liberation of fixed ammonia, complete with decarbonating and desulphurizing sections. Milk of lime is continuously fed into the liming chambers with open steam for agitating and heating. The crude ammonia gas passes away for treatment in ancillary plant and finally the pure ammonia gas is absorbed in clean water, held in large cylindrical steel vessels until of 880 strength. The foul gases pass away separately and after passing through $NH_3$ catch towers for any traces of ammonia, the $CO_2$ and $H_2S$ gases, &c., pass on through open oxide purifier boxes to atmosphere.

On the anhydrous side of the plant the 880 liquor ammonia is placed in an indirect steam heated still, and as is well known, the application of heat drives off the ammonia gas from the 880 solution, which gas after passing through suitable driers is compressed and after passing through condensers, the now liquid or anhydrous ammonia is stored in specially constructed steel cyinders under pressure up to 180 lb. per sq.in., depending upon atmospheric pressure, from which it is finally allowed to pass into commercial ammonia cylinders of 25, 50, 100, or 150 lb. capacity, after they have been subjected to a complete vacuum. All ammonia cylinders are then tested by drawing off a 2 oz. sample in a closed flask with a bunsen valve and evaporating to dryness.

There are many novel features in this plant which has a capacity of over 200,000 lb. of anhydrous ammonia per annum, and with the exception of the Linde ammonia compressor, a vacuum pump, cylinders, and gauges, the whole of the plant has been designed and manufactured in the Company's workshops.

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# Gas Undertakings Results

### ochester, Chatham, and Gillingham

In their report for the past year, the Directors of the Rochester, Chatham, and Gillingham Gas Company state that the sales of gas show an increase of 8.45% over those of the previous year; the total being 1,289,157,896 cu.ft. This includes the quantity sold to the Sittingbourne District Gas Company, without which the increase is equal to 2.85%. The balance of revenue carried to Net Revenue Account is £41,754, which compares with the sum of £40,901 a year ago. The amount received for bulk sales on this occasion is £9,412, as against £3,919 in 1938. A dividend on the consolidated ordinary stock for the year of 6½% will leave a balance of £19,608 to be carried forward. The dividend was the same last year, with a carry forward of £20,363.

### York

The output of gas by the York Gas Company during the past year amounted to 4,546,738 therms, or a small reduction of 1.87% when compared with the total for the preceding year. The profit for the year amounts to £26,299, and the balance of net revenue brought forward was £3,152. A year ago the profit was £16,578, but the amount brought forward from 1937 was £9,634. The dividend on the consolidated ordinary stock remains the same, at 5% for the year. This will leave a balance of net revenue to be carried forward of £8,046. During the year the Company introduced their "New Era" tariff, offering gas on advantageous terms to popularize large-scale use. The outbreak of war put a temporary stop to the programme for extending the adoption of this new facility among the consumers, many of whom have taken advantage of it already. It was necessary to advance the price of gas from the December meter readings. While coal and oil for the year cost £3,000 more, returns from residuals were well over £5,000 less.

### Yorktown (Camberley)

The report for the past year of the Yorktown (Camberley) and District Gas and Electricity Company states that, while the business of the Company continues to show satisfactory expansion despite war conditions, rises in the cost of coal, materials, and labour necessitated an increase in the price of gas, which, under the sliding-scale, automatically reduced the rate of dividend upon the ordinary stock. The gross profit for the year in respect of the combined undertaking is £29,478, as against £28,485 a year ago. The dividend of 6% for the year on the consolidated ordinary stock (as compared with 6½% in respect of 1938) will leave £11,028 to be carried forward to the next account. The carry-forward a year ago was £11,530. The total quantity of gas sold during the past twelve months was 332,370,200 cu.ft., as compared with 322,739,500 cu.ft. in 1938.

# - Aspects of Coal Testing -

By

F. DUCKWORTH, B.Sc., A.I.C.,

of the Tottenham and District Gas Company

**Discussion on the Paper to the London and Southern District Junior Gas Association on Feb. 23—see last week's issue of the "JOURNAL"**

The **President** (Mr. F. O. Hawes, Tottenham), opening the discussion, observed that this study of available coals by means of the Gray-King assay and published information on the National Coal Survey had made it possible to keep a close watch on factors' deliveries, while it also enabled gas undertakings to know just what the collieries were doing. They might get a mixture they liked or a mixture they did not like, and this information gave them a fairly shrewd idea of what was happening at the colliery. It had become a powerful weapon in their hands. Mr. Hawes welcomed to the meeting Mr. D. MacDougall, of the Fuel Research Station, and invited him to make a few observations on the Paper.

Mr. **D. MacDougall** (Fuel Research Station) congratulated Mr. Duckworth on a very interesting Paper and on what he felt was a most useful piece of work, which might, in the broad sense, be termed a long-range research in that it was a search for the most suitable coal for gas production. It differed, however, from that type of research in that the results obtained were immediately available for deciding the best type of coal to be employed for gas-making purposes. It was gratifying to learn that Mr. Duckworth had found the information contained in the Reports published by the D.S.I.R. (Fuel Research Division) on the Survey of National Coal Resources of considerable value when looking for coal suitable for use in the Gas Industry. A large number of seams in the country had been examined, and a considerable amount of information was now available concerning the coal suitable for different purposes. By a careful study of the Papers published by the Fuel Research Board, Mr. MacDougall felt that the Gas Industry would find information which would help them appreciably in their search for suitable gas-making coals.

As the Author had stated, went on Mr. MacDougall, considerable difference of opinion existed as to the value of the laboratory scale experiments as a guide to the behaviour of the coal and the yields to be obtained in large-scale carbonizing plant. He thought, however, it might be agreed that laboratory experiments could give a very useful guide to the behaviour of coal in a large-scale plant and also to the yields of products which might be expected. He knew that this applied in the case of coal to be utilized for low-temperature carbonization when the type of coal was of major importance in the case of operation of the retort. The effect of the type of coal on the ease of operation was not so important in the high-temperature carbonizing industry, and especially so if horizontal retorts or retorts operating with a static charge were under consideration. His own experience showed, however, that laboratory experiments in the Gray-King assay could give a very good guide to the yields of gas, &c., likely to be obtained in high-temperature plants.

## Calculating the Oxygen Content

Mr. Duckworth's method of calculating the oxygen content of the coal from the oxygen in the volatile constituents obtained in the Gray-King assay was of interest. It should, however, be realized that errors were also involved in the method of calculation adopted in the present case. Mr. MacDougall understood that the liquor obtained was considered to be all water, and the mean figure was taken for the oxygen content of the tar. An error is also involved due to the $O_2$ remaining in the coke. Mr. Duckworth had stated that the coals for which results were most difficult to duplicate in the assay were those of strongly caking properties, owing to the fact that the coal expanded beyond the carbonizing zone and entered the cracking zone. He agreed that, due to this, irregular heating of the coal occurred, and the volatile products evolved were incorrectly cracked. To obviate this, it had formerly been the practice to decrease the quantity of coal used or to blend with electrode-carbon. Obviously, these expedients were not entirely satisfactory and might result in different times of contact of the volatile products with the cracking medium. It was therefore decided some time ago that for coal of the highly swelling type a different type of tube should be employed. The tube now recommended was one with its diameter increased towards the closed end. This allowed for a considerable expansion of the coal, while retaining the coal charge within the carbonizing zone. By this means the same quantity of coal could be utilized irrespective of its caking properties, and satisfactory duplicates could be obtained even from the most strongly swelling coal.

The conclusions reached by Mr. Duckworth concerning the correlation of hydrogen and oxygen contents of the coal with their gas-making qualities were of interest. In a Paper read before the Institute of Fuel in 1939 by Dr. King, of the Fuel Research Station, he quoted data concerning the yields of gas in the assay from four typical caking coals. He also gave gas yields from intermittent vertical chambers from each of these coals blended with two weakly caking coals. The assay yields of the caking coals showed hydrogen contents varying from 5.2% to 6.3% and oxygen contents of from 4.5% to 6.6%. The differences in gas yields were only from 12,500 cu.ft. to 12,870 cu.ft., while the thermal yields varied from 74 to 78 per ton, calculated on a dry ash-free coal.

He was also interested, said Mr. MacDougall, to note Mr. Duckworth's point regarding the information obtained by consulting the Fuel Research Coal Survey reports on the Hutton and Low Main seams in Durham, and especially the point that by means of the assay it was possible to determine which would be the better seam to purchase for gas production. Unfortunately, in the particular case cited the high sulphur content of the former seam prevented the use of this seam alone; but there was a very good example here of the value of the Survey to one Industry in helping in the selection of suitable coals.

## Cause of Rapid Heating

**Mr. P. Clephane** (Gas Light and Coke Company) congratulated Mr. Duckworth on his most interesting and useful paper but said that there were several points which he felt left room for amplification. In the first place it was not obvious why swelling of the coal charge into the cracking zone should cause abnormally rapid heating. The carbonizing zone started at 300° C. and was raised to 900° C. during the test. The cracking zone was maintained at 800° C. throughout. The intermediate space between the two zones occupied by the ends of the two heating elements would probably be at a rather lower temperature. Had the possibility that the lower yield of gaseous therms was due to incomplete carbonization of the extruded portion of the charge, rather than to inadequate cracking of the volatile matter been considered? Again, on the question of the treatment of the highly intumescent coals, with all due deference to the Fuel Research Board recommendations, the addition of retort carbon to prevent swelling invalidated the assay as an evaluation of the behaviour of straight coal. Between 1921 and 1925, Mr. Clephane carried out an investigation into the effects of additions of inert matter upon the volatile yield from coal, using an apparatus similar to the Gray-King, but with no packing in the cracking zone. It proved possible to increase the volatile yields (at 900° C.) by a maximum of from 1½% to 2% by the addition of just sufficient carbon to prevent the formation of a sintered coke. Smaller increases were obtained with less or more diluent. Those results had since received support from breeze blending experiments carried out on the coke oven plant at Beckton.

Bound up with this question was the significance of the cracking efficiency factor. The author had covered himself pretty thoroughly and apparently made no particular claim that it really represented anything: but it presumably had some interest beyond the fact that it frequently happened to be 74. Mr. Clephane said he would appreciate a little clarification on this point.

The author made considerable use of the thermal yield of tar. It would be of interest to know whether the proportion of the tar held up in the retort tube was assumed to have the same thermal value as the lighter portion collected in the purifying train and how far such assumption, if made, was likely to be in error. It would also be interesting to know whether the yields of 72 to 83 therms per ton, quoted for the assay results bore a direct relationship to the yields obtained in practice from the same coals when the internal retort temperature was 100°-200° C. higher than in the case of the experimental apparatus. In conclusion, it was obvious that the Tottenham Company had derived considerable benefit from the application of the

method, and it was pleasing to find that the efforts of the Fuel Research Board and the National Coal Survey were being put to practical use by the Gas Industry.

Mr. **C. A. Deas** (Tottenham), referring to Mr. Duckworth's opening remarks in which he suggested that perhaps the present was not an opportune time for bringing up the question of coal testing in view of the difficulties of obtaining supplies, said it seemed to him that it was as important as ever that a check be kept on the quality of the coals received. Many undertakings had built up a valuable domestic coke market at no little expense, and if the quality of coke deteriorated as the result of inferior coals much hard won custom was likely to be lost—perhaps indefinitely. The public unfortunately would blame the Gas Industry and not the collieries if their coke was not up to the standard they had been in the habit of expecting. Apart from all this, surely the maintenance of coal quality was of National importance. They had been told that the present difficulty in obtaining supplies was due to transport. If coal was allowed to deteriorate due to lack of proper cleansing at the pit head, then the transport difficulty would obviously be aggravated and serious waste of the Nation's resources would occur. Mr. Deas commented upon the fact that if the ash content rose considerably, transport would be occupied in moving about possibly thousands of tons of sheer rubbish.

He quite appreciated that circumstances could occur when it would be impossible to maintain their present-day standard of clean coal, but he suggested that from both the Gas Industry's and the National point of view they should continue with their control of coal quality by constant check tests on deliveries. A 1% increase in ash content of the coals carbonized by the Gas Industry alone would necessitate providing transport for some 180,000 tons of useless material annually.

With regard to the Gray-King tests described by Mr. Duckworth, Mr. Deas said he had from time to time had the opportunity of comparing the results obtained with those achieved under actual works practice, and he was in entire agreement with Mr. Duckworth when he stated that the Gray-King assay had been, and was still, of great value in seeking deliveries of the most suitable coal. He would suggest, however, that, if possible, there was nothing like a full-scale trial of a coal under normal working conditions in the retort house. On a small or medium sized works this was usually quite a practical proposition, but on a large works was out of the question; but the Gray-King test was undoubtedly a good alternative.

He was interested to hear Mr. Duckworth's remark that very often too much attention was paid to the therm per ton capabilities of a coal. He fully endorsed this remark. Therms per ton while perhaps a useful index of a coal being suitable for gas-works use was of comparatively second-rate importance. The ability of a coal to give a good free-burning coke which would stand handling without the production of breeze and dust was of great importance. There were also other factors—*e.g.*, a coal which would travel nicely and steam satisfactorily under vertical retort conditions. With regard to the weathering of coal, his own experience under practical conditions agreed with Mr. Duckworth's observation, that the gaseous thermal yield did not appear to suffer unduly, but that there was a definite deterioration in the coking properties of the coal. In addition, he had observed that the deterioration which did occur in gaseous yield is more pronounced on the calorific value of the gas.

Mr. **A. K. Gould** (Ely) said he was under the impression that a very important factor was the time which the coal had to be baked before the greater proportion of the gas was driven off. If the coal was baked rapidly it increased the throughput of the plant at the same time increasing the amount of coke for sale. With regard to steaming in vertical retorts, if a coal did not steam well it was necessary to reduce the throughput to give sufficient dilution. But with coal that would steam readily one could increase the throughput. Finally, the burnability of coke for domestic purposes was very important. Mr. Gould said he would like to see a coke test to determine the weight of coke burnt per hour and the lowest temperature at which that weight could be burnt.

## Effect of Weathering

Mr. **R. F. Twist** (South Metropolitan) considered it remarkable that laboratory tests could be reproduced so accurately in the retort when they remembered that there was a tremendous rush of gas along the relatively cool retort wall, while towards the end of the carbonizing period there was a small quantity of gas passing up from the core and going through the coke. That was not to say that the conditions of cracking were identical. Examination of the tar products revealed that the tar in the laboratory test was not the same as the tar on the works. With regard to the weathering of coal, they had also found in the South Metropolitan Company that the gas yield did not seem to suffer very much; but they found that the tar therms went down a good deal when the coal had been exposed. There seemed to be a feeling that field coal—*i.e.*, coal stored in the open as distinct from that stored under cover—did not give the same high yield as one would expect from the laboratory test. It might be that the laboratory test ignored one feature when carbonizing coal in the retort. Field coal when picked up was very wet indeed as it had to be watered down frequently. Thus a retort charge of a specified weight contained less coal than a normal charge by reason of the weight of water—the coal being so wet that it did not pack well. That must, of course, affect the cracking conditions in the retort—a point which could not be reproduced in the laboratory tests. Mr. Twist mentioned a sample of field coal which had been in store for ten years. They expected a low gas yield in the assay, but it turned out to be only a few therms per ton lower than they had reason to anticipate—expressed on a dry ash-free basis. They usually found the ash content of field coal very high indeed, and this was thought to be due to the fact that it was cooled with river water which, on evaporation, left a considerable amount of solid substances behind.

The **President** observed that continuous vertical retorts presented a peculiar type of carbonization compared with static conditions. There was a moving body of coal passing down the retort which was being carbonized as it travelled, and the plastic zone was in the form of a conical bag hanging down from the top of the retort. Moreover, in continuous verticals the primary gases were subjected to two conditions—those which were coming from the interior of the conical bag escaped up through the green coal charge almost uncracked, whereas those from the outer side of the envelope passed up the retort face and were degraded by overcracking. They tried on one occasion at Tottenham to utilize the Gray-King assay in such a way as to reproduce these conditions. One charge they deliberately undercracked by reducing the temperature of the cracking medium. The other charge was used to yield an overcracked gas, and the mixed gases gave results more nearly conforming to continuous vertical practice than by any other means. This led them to the assumption that the trunk feeds were not necessarily on the right lines, and they wondered whether there was not some method of perforating the envelope. Mr. Hawes also wondered whether it would be possible to obtain a direct correlation of the Gray-King assay with various types of carbonizing plant by carbonizing one or two samples of the coal and altering the conditions of cracking so as to obtain a Pexton figure similar to the plant with which it was desired to correlate the results. For instance, the Pexton figure obtained in intermittent verticals was about 38 to 39, while that for continuous verticals was 35 or so. The figure with a straight Gray-King assay was usually about 37. It might be possible, therefore, to alter the temperature in the cracking zone so that if they wanted to know how a coal would behave in a certain plant they could use the Gray-King assay to give a Pexton figure to correspond with the appropriate figure.

## The Author's Reply

Mr. **Duckworth** thanked Mr. MacDougall for his remarks and was very interested to learn that at certain points he also had found the Hutton seam to be a richer gas-making seam than the Low Main. He wished to emphasize, however, that his detailed comparison of these two seams applied only to the limited area covered by one colliery company. Mr. MacDougall had pointed out that certain errors might occur in the author's method of calculation of the oxygen. Mr. Duckworth appreciated this, but ventured the opinion that the fact that the figures could be duplicated with a high degree of accuracy made them a useful guide in his assessment of coals. He looked forward to using one of the new design of retorts to which Mr. MacDougall referred, for, as Mr. Clephane had observed, the mixing of coal with electrode-carbon, and also the simple fact of using a smaller quantity of coal was likely to affect the volatile results to an appreciable extent.

Dealing with Mr. Clephane's remarks in greater detail, Mr. Duckworth said that a very interesting point had been raised, with regard to the low thermal yields obtained when coals had swollen into the cracking zone. Mr. Clephane had suggested that the portion of coal between the two furnaces might be incompletely carbonized. Mr. Duckworth did not think that this was likely to occur to any marked extent, but said that it would be interesting to compare the volatile therms on such cokes, and on cokes from a normal assay. In cases where the coal had actually swollen into the cracking zone, undercracking was apparent from the tar and gas yields. In answer to Mr. Clephane's question about the accuracy of the figure given for therms as tar. Mr. Duckworth said that this figure amounted to only about 8% of the total therms, and although he had not made any actual determinations, probably the difference in C.V. between the pitch remaining in the mouth of the retort and the tar condensing in the U tube would not involve any appreciable error. The pitch remaining at the mouth of the retort was fairly constant at about 20% of the total tar. As Mr. Clephane had surmised, no particular claims were made for the cracking efficiency factor other than its use as a check on the normality of the assay in conjunction with:

(a) Weight balance.

(b) Comparison of total therms with oxygen content of the coal.

Mr. Duckworth was glad to hear Mr. Deas' strong stand for the maintenance of coal quality, as on this point he was in complete agreement with him. He was also pleased to hear that the Gray-King tests had correlated so well with what he had found on his horizontal plant. With reference to Mr. Deas' remarks on storage

of coal, Mr. Duckworth pointed out that he had been speaking only of a comparatively short period of storage, and that weathering appeared to be a multi-stage process. During the early stages of oxidation, some seams appeared to effect a slight improvement in gaseous thermal yield at the expense of the tar yield. It must be anticipated, however, that the gaseous thermal yield would ultimately decline. Certain seams they had experienced (as, for example, the eastern sections of the Barnsley seam) showed a tendency to oxidize rapidly, with immediate deterioration. It was possible that the oxidation during transport from colliery to consumer was appreciable in such cases.

With reference to Mr. Gould's remarks, experience with the assay had shown by means of the current consumption that coals varied considerably in the quantity of heat required for carbonization. In answer to the question as to the advisability of storing very low oxygen coals, Mr. Duckworth pointed out that these coals were usually of low caking power and also of low volatile matter. Moreover, they rapidly lost what little coking power they possessed.

It was now becoming more generally accepted that the effects most quickly apparent with the use of weathered coal in horizontal retorts were, as Mr. Twist had found, a decrease in coking power and in tar therms. The gaseous therms from Durham coals did not appear to deteriorate in horizontal retorts to the same marked extent. While dealing with this point, he wished to put forward for consideration a few theories which might account for this maintenance of gaseous therms. First, with weathered coal, he had found that the peak gas rate was lower than with new coal. This meant that the volatile matter evolved over this critical period stood a better opportunity of being "cracked." This would result in the observed effects of lower tar yield but maintained gaseous thermal yields. Another point which might help to maintain the gaseous thermal yield was that the oxygen content of the coal increased on weathering, and on carbonization this oxygen was evolved partly as CO, but mainly as water which might have the opportunity of reacting with the coke to form water gas and so contribute to the gaseous therms.

In horizontal plant, the use of weathered coal usually resulted in a drop in calorific value. This was in agreement with the above theories. In both horizontal and intermittent vertical chambers, however, efficient cracking of the tar tended to minimize the drop in C.V. Owing to the poorer conditions of "cracking" in continuous vertical retorts, as mentioned by Mr. Hawes, there was not the same opportunity for tar "cracking" to maintain either the C.V. or the gaseous therms per ton. Hence, to maintain the calorific value on stock coal and in these retorts, steaming had usually to be reduced.

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A cordial vote of thanks to Mr. Duckworth for his Paper was passed on the proposition of Mr. **H. Moys** (Commercial), seconded by Mr. **R. W. Latham** (Croydon).

# Economic Utilization of Unscreened Coke Breeze

By
S. H. STOKES,
Assistant Engineer and Manager Elland-cum Greetland Gas Company

**Abstract of a Paper given to the Yorkshire Junior Gas Association at Bradford on Feb. 24.**

At the present time higher efficiencies are being sought on the production side by gas undertakings in order to reduce the cost per therm of gas into holder. The Paper covers experimental work, now in practice, whereby greater efficiency in the conversion of coal into gas, coke, and residual by-products is claimed by the utilization of 0 to $\frac{5}{8}$ in. coke breeze in the producers in place of the more valuable coke.

In a works carbonizing 10,000 tons of coal per annum in continuous vertical retorts, the gross coke made is 13.35 cwt. per ton of coal, of which 1.6 cwt. is breeze of 0 to $\frac{5}{8}$ in. Of the 800 tons of coke breeze made, 87 tons is required for maintaining a reserve supply of steam in the fuel-fired boiler and for providing steam for all processes during four weeks of the year, when the waste heat boiler is out of action for examination or repair. Utilization of the remaining 713 tons of coke breeze will result in a further amount of approximately 713 tons of valuable coke becoming available for sale.

The Paper is concerned with pressure-type breeze-burning producers. When the proportion of air in the steam-air mixture is greatest, the producer is then supplying the amount of fuel gas for which it was designed; a greater or lesser steam consumption with equivalent increased or decreased output of fuel gas, decreases the proportion of air injected per pound of steam, and the steam used per lb. of fuel consumed in the producer increases. An excessive proportion of steam causes low fuel bed temperatures, poor carbon monoxide formation and excessive hydrogen formation. Experiments were, therefore, conducted to balance up the steam input most conducive to effective combustion of the coke breeze with the output of producer gas required under varying conditions of load. The experiments proved that the coke breeze could be most efficiently gasified when present to the extent of 40% of the total fuel used. Control of clinker formation was the most important factor in producing optimum results, the clinkering periods being of 24 to 48 hr. duration according to load; from 89.59 to 95.90% respectively of the breeze supplied to the producers was wholly consumed. The saving effected was 0.287d. per therm of gas produced, the net cost of the fuel used being 0.463d. per therm of gas produced.

## DISCUSSION

The **President** (Mr. T. G. Lewis, Leeds) welcomed the presence of Mr. H. Singleton, Engineer and General Manager of the Huddersfield Corporation Gas Department and President of the Manchester District Association of Gas Engineers.

Mr. **H. Singleton** congratulated Mr. Stokes on a Paper full of ideas and showing that a great deal of ingenuity had been put into the investigations described. He noted that Mr. Stokes had named no cash value for breeze as a saleable commodity. Admittedly it had a limited market, but there were some in the industry who had to sell it. Had the Author done anything in the way of comparison between the cost of using a mechanical blower, which would give a positive pressure under the fuel bars, as against the steam air injector? By this means the air admitted could be controlled more definitely and the endothermic reaction due to admission of steam—which might be exhaust steam from the mechanical blower—could be controlled more definitely in preventing clinker formation in the fuel bed. It might, of course, be that the mechanical blower was out of the question by reason of working cost; but, after all, the chief reason for having a producer was to maintain a constant temperature, or one might throw away a good deal more than the 0.287d. per therm claimed to be saved.

Mr. **Stokes** said it was true that in some areas breeze had an actual sale value, but in others it was practically valueless. Perhaps with the present increased demand for coke a selling value might be put more generally on breeze. In regard to the question of a mechanical blower, he was quite sure this could be applied if the amount of air was limited and there was not too great an increase of travel of air through the fire, and provided exhaust steam was employed for controlling the temperature and cooling the furnace bars. He had, however, no personal experience in that direction.

Mr. **C. A. Newham** (Leeds) congratulated Mr. Stokes on his excellent results. Any breeze which could be used in place of coke must necessarily show a saving. In the matter of velocity of air or steam-air mixture entering the fire, in his experience the tendency had been to increase rather than decrease that velocity.

Mr. **Stokes** agreed with Mr. Newham's observations as to rate of air travel. When the producers concerned in the Paper were designed the designers probably had not in mind that they were going to utilize all the breeze. If the breeze were increased up to 50% the temperature of the fire tended to drop and the quality of the producer gas would come down.

Mr. **J. Castle** (Brighouse) said the amount of coke required per ton of coal carbonized could influence the value of breeze—a point to which the Paper did not refer. Breeze at the source, if used on the spot, might be regarded as worth perhaps about 10s. per ton, but the speaker agreed with Mr. Stokes in giving the breeze no monetary value. Transport costs might swallow up the whole value of the breeze.

Mr. **Stokes** said the price one might give to breeze must vary with local demand.

Mr. **F. Beaumont** (Huddersfield) wondered whether the use of coke alone for, say, the last two charges before clinkering would help to prevent the running of "fines."

Mr. **Stokes** said he did not see any real advantage in that. It

would reduce the amount of saving, whereas the whole object was to effect a saving and at the same time to utilize the breeze.

Mr. **W. S. Hubbard** (Leeds) thought that a step-grate producer was not the most suitable for burning breeze. A very common practice in many works was to burn the breeze in Lancashire boilers, but he did not consider that as economic.

Hearty thanks to Mr. Stokes for his Paper were carried on the motion of Mr. **D. C. Gunn** (Leeds), seconded by Mr. **A. P. Jennings** (Leeds).

Mr. **G. E. Currier,** Engineer and General Manager of the Bradford Gas Department, responded to a vote of thanks for hospitality. He congratulated the Association on resuming activities after a brief suspension. It was important that members of the Industry should be kept in direct contact with each other.

# Relieving Pressure in the Foul Main

## A Readily Adjustable and Compact Valve

A new patent (No. 516,228; application date, June 15, 1938) relates to valves for relieving the gas pressure in the foul main of a carbonization retort system, should the exhausters be put out of action for any cause, such as because of breakdown of the gas distribution system, which may occur due to bombing or other war activity. It has been taken out by Meters, Ltd., A. Whatmore, and H. V. Barnes.

The object is to provide a compact construction of valve, which is efficient in operation, avoids the use of stuffing boxes, and can

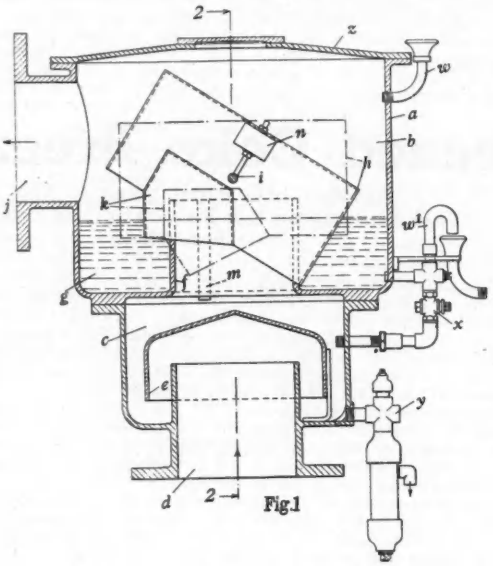


Fig.1

be readily adjusted to suit any desired conditions of pressure within certain limits.

One construction of the valve can be seen by reference to the accompanying drawings—Fig. 1, a medial vertical sectional elevation, and Fig. 2, a part-sectional elevation.

There is an outer casing *a* divided into upper and lower chambers *b* and *c* respectively. Gas enters the lower chamber *c* from the foul main of a retort system through the connexion *d*. Provision is made for effecting a water seal at *e*, so that the upper chamber can be opened for cleaning, inspection, or repair without escape of gas, but normally no water is present in the lower chamber.

Gas after passing through the lower chamber *c* enters the upper chamber *b* through a passage *f* at a point above the surface level of a sealing liquid *g*, which may conveniently be water whereon floats a layer of oil. The layer of oil guards against corrosion and checks evaporation losses.

Over the gas inlet passage *f* is a bell *h* mounted upon a horizontal spindle *i* supported on knife edges $i^1$, which bell normally occupies the position shown in chain lines in Fig. 1, in which position its edges dip beneath the sealing liquid *g*, so that no gas escapes, but which can tilt to the position shown in full lines in Fig. 1, in which position gas can pass freely from the passage *f* to an outlet connexion *j*.

Non-symmetrically disposed relatively to the spindle *i* are two smaller bells *k* and $k^1$, secured one to each side of the bell *h*. The edges of these bells *k* and $k^1$ always remain below the surface of the sealing liquid, whatever the position of the bells. Two pipes *m* and $m^1$ put the interiors of the bells *k* and $k^1$ respectively in communication with the lower chamber *c*, so that the interiors of these bells are always exposed to the gas pressure in the foul main. When this pressure rises the non-symmetrical lifting force beneath the bells *k* and $k^1$ tilts the bell *h* and allows gas to escape until the pressure has been reduced to normal, whereupon the bell returns to its normal gas sealing position.

The bells are counterbalanced to control their point of tilting in response to increase of gas pressure and to restore them to their normal position afterwards by means of adjustable counterweights *n*, *o*, and *p*. The counterweight *n* is upon the spindle *i* and the counterweights *o* and *p* are upon arms extending at right angles to one another upon a short horizontal spindle *q*, mounted on knife edges $q^1$ in a smaller casing *r* secured to the main casing *a* and having a detachable upper portion $r^1$. There is another arm *s* upon the spindle *q* which carries a peg *t* passing through an arcuate slot *u* in the wall of the casing *a* and engaging in the slotted end of an arm *v* upon the spindle *i*. The sealing liquid is at the same level in the casings *a* and *r* and seals the slot *u*, so that the casing portion $r^1$ can be removed to adjust the counterweights *o* and *p* without escape of gas.

Water can be delivered into the upper chamber *b* from an inlet *w* and removed therefrom either by an overflow $w^1$ or past a valve *x* to the lower chamber *c* when a water seal therein is desired, whence it may be released by a drain connexion *y*.

When the water has been drained from *b* to *c* a detachable cover *z* to the casing *a* may be removed and the bells and spindle assembly *h*, *k*, $k^1$, is lifted out and replaced without undoing any parts or disturbing the setting of the counterweights.

The relief valve must be placed between the retorts and the retort house governor so that it is not affected by fluctuations in pressure from the exhausters. In operation, the valve remains closed under the normal conditions when the gas pressure in the foul main is governed to give either a slight vacuum or level gauge. Should the exhausters fail or be stopped through some cause or other, then the pressure in the retorts and the foul main gradually builds up until, acting under the control bells *k* and $k^1$ it is sufficient to overcome the loading of the counterbalance weight and turn the valve unit about the bearings so that the edges of the valve come above the level of the liquid and allow the gas to escape through the outlet connexion to the atmosphere.

On return to normal conditions the pressure under the control bells *k* and $k^1$ drops and the counterbalance weight brings the

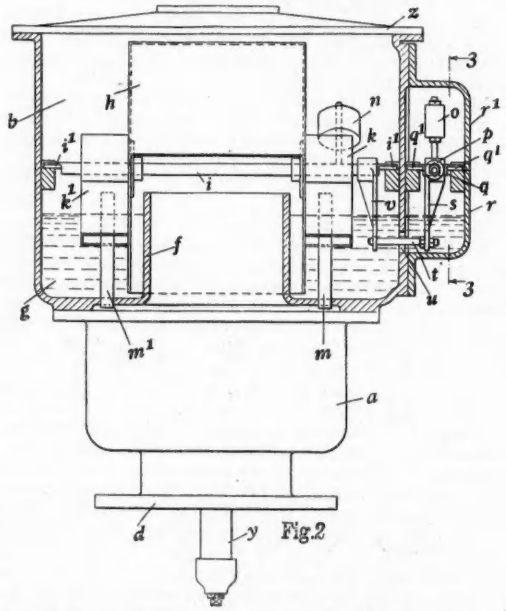


Fig.2

valve back to the closed position again, thereby sealing the main from the atmosphere.

By altering the position of the counterbalance weight *p* the valve can be set to release the gas at any differences in pressure (say) between $\frac{1}{10}$ in. and $\frac{3}{10}$ in. water gauge.

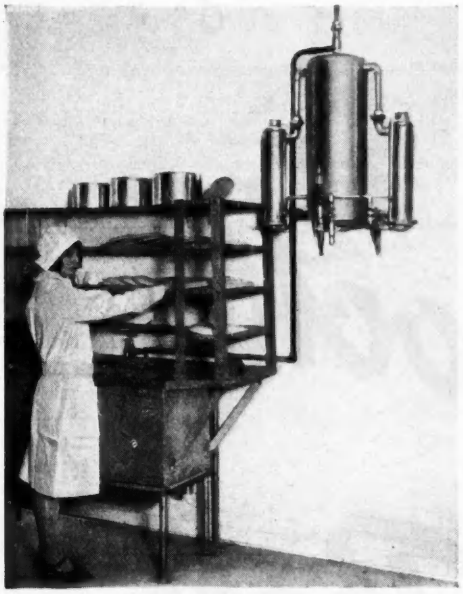
The valve can be tested at any time by simply altering the loading of the retort house governor.

The construction described works, state the patentees, with a minimum amount of friction and has no packings which deteriorate in service. It provides a large area for the escape of gas for a small increase in foul main pressure.

# Trade News

### Sentry Gas Water Heater

The Sentry Boiler Co., Ltd., of Newman Street, London, W.1, which was among the pioneers of the domestic coke boiler, has produced a new Sentry gas water heater which can be fitted to existing hot water pipes or tank to work with or independently of the domestic boiler. The heater affords a ready and constant supply of really hot water throughout the house, and, when desired, it can be controlled by a thermostat, which is recommended when hot water is required at a maintained temperature day and night. Alternatively, the gas, which is ignited by a pilot light, can be turned on only when required. With a gas consumption of 45 cu.ft. per hour with 500 B.Th.U. gas, the heater has a hot water output of 20,000 B.Th.U. per hour. It is extremely simple to fix and, in conjunction to the domestic boiler, it is a very satisfactory means



Showing two Heaters connected to a large H.W. Cylinder in a restaurant.

of providing constant hot water all the year round. It is useful also for restaurant work, in which case more than one heater can be connected to a large hot water cylinder. The same principle is employed in the new Sentry gas storage heater, designed to meet the demand for an entirely independent multi-point hot water supply. The appliance consists of a Sentry gas water heater surrouded by a cylindrical storage tank of 10-11 gal. capacity, and it is suitable for flats, small houses, hairdressing establishments, and business premises.

### Stanton Products in Wartime

How Stanton products can help the engineer faced with the dual problem of maintaining public services and protecting his staff during air raids is the theme of a 16-page booklet from the Stanton Ironworks Co., Ltd. When the last war broke out 25 years ago it was not considered necessary to take air raid precautions. The position is very different to-day, but fortunately, though the danger is greater, the means for meeting it have been correspondingly improved. The toughness and ductility produced by the Delavaud centrifugal system and the Mairy ferro-silicon process enables Stanton Spun-Iron pipes to withstand shocks that would fracture an ordinary sand cast pipe, and they are, therefore, very suitable for use in war as in peace. Speed is the first consideration in repairing broken mains in emergency, and the introduction and development of self-adjusting joints has made it possible to joint pipes efficiently and rapidly under the most adverse conditions.

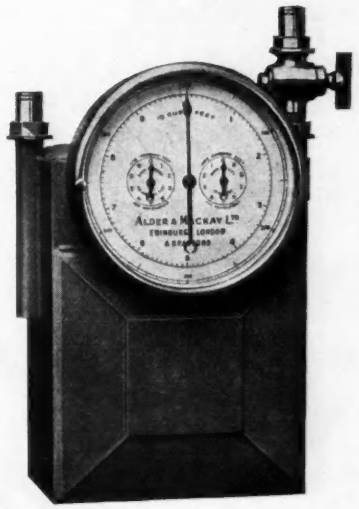
With several years' experience in the construction of air raid shelters, the Company is now in a position to supply reinforced concrete shelters of approved designs suitable for the protection of key men, factory workers and office staffs. A shelter of special design is available for wardens' posts. Corrosion-resisting cast iron shelters are also being produced, and a special point in their favour is that they have a high salvage value. In the event of such a shelter being dismantled after a period of years, the owner can recoup himself to a considerable extent for his original outlay.


'A & M'

DRY DEMONSTRATION

METERS

*Specially designed for Showroom or Cookery Demonstration Work.*

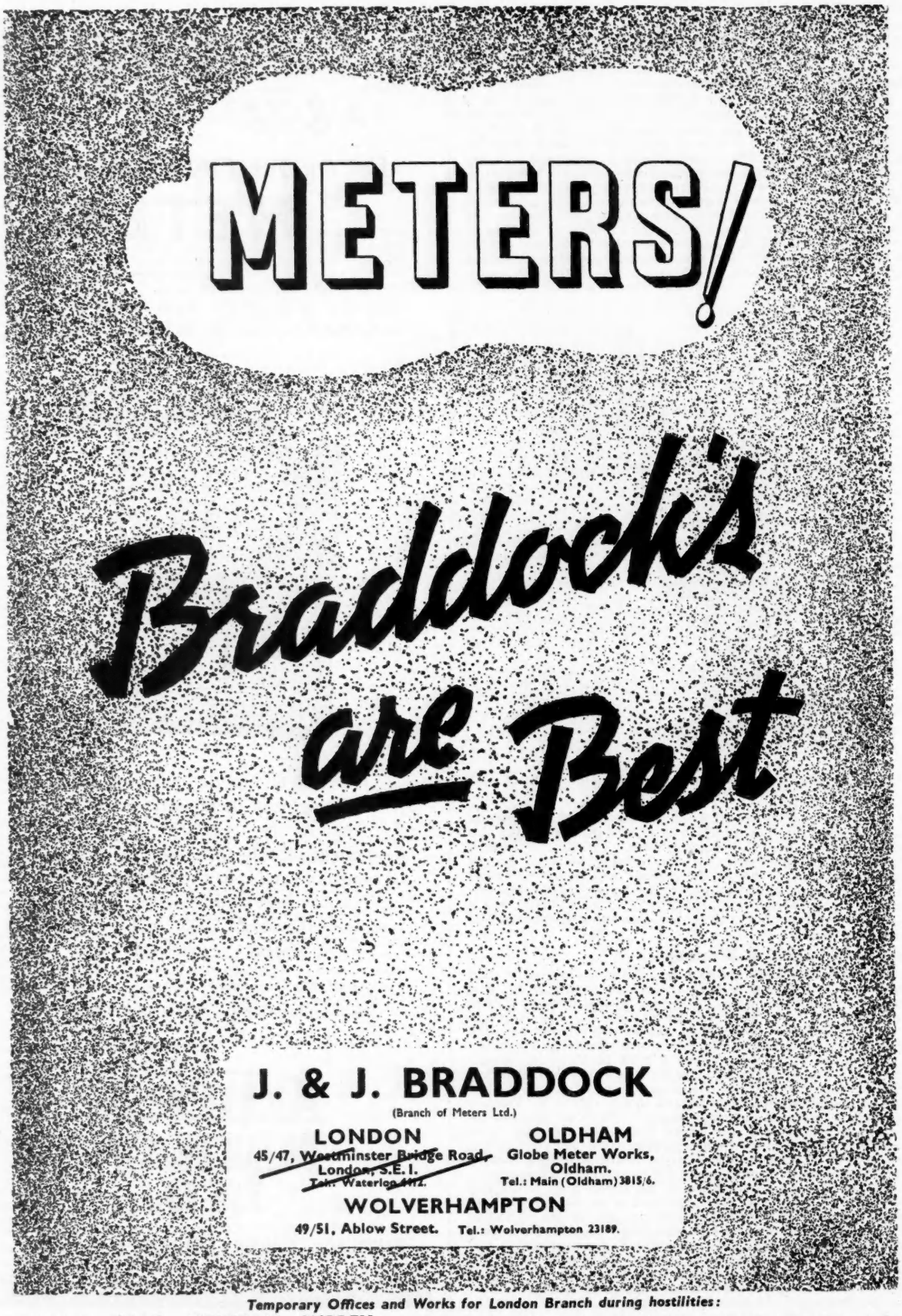


The dial is 9 in. in diameter and a large pointer demonstrates on the outer of the two large circles the hourly rate by one minute observation; and on the inner circle 5 cubic feet and 10 cubic feet in the 100 and 200 cubic feet meters respectively.

Available in two sizes for 100 and 200 cubic feet per hour.

ALDER & MACKAY LTD.

EDINBURGH - LONDON - BRADFORD & BRANCHES




*Temporary Offices and Works for London Branch during hostilities:*
**MORDEN ROAD, MITCHAM, SURREY.** Telephone No. 2124. Telegraphic Address: "Metrique, Phone, London."

# Current Sales of Gas Products

### The London Market

March 18.

To-day's values of tar products in the London market are as follows:

Pitch is rising, and is said to be about 40s. per ton f.o.b.

Creosote about 5d. per gallon.

Refined tar 3¾d. to 4d. per gallon.

The price of pure toluole under the Ministry of Supply Order is just under 2s. 5d. per gallon.

Pure Benzole is about 1s. 10d.

95/160 solvent naphtha about 1s. 11d.

90/160 pyridine about 16s. to 17s.

All per gallon naked.

Refined naphthalene crystals about £20 per ton in bags.

All *ex* makers' works.

### The Provinces

March 18.

Crude Gas-Works Tar, 24s. to 29s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

**The average prices of gas-works products during the week were: Pitch—East Coast, 40s. to 42s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 37s. 6d.* Toluole, naked, North, 1s. 9½d. (Controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 9d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 4½d. to 1s. 5½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 5d.; Scotland, 4¾d. to 5d.; low gravity, 4¾d. to 5d. Carbolic acid, 60's. 3s. 6d. to 3s. 7½d. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil, (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5¾d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.**

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

### Scotland

GLASGOW, March 16.

During the week there has been no material alteration in value of any product. While enquiries are quite plentiful, orders are comparatively scarce.

**Crude gas-works tar.**—Actual value is unchanged at round 35s. to 37s. per ton *ex* works in bulk.

**Pitch.**—The shipping season is drawing to a close with value steady at 27s. 6d. to 30s. per ton f.o.b. for export. In the home market quotations are round 27s. 6d. per ton *ex* works in bulk for home trade.

**Refined tar.**—Makers' prices for delivery in the home market are controlled at 4¼d. to 4½d. per gallon. For export supplies can be secured at 2½d. to 2¾d. per gallon, both f.o.r. naked.

**Creosote oil.**—Available supplies are sufficient to meet buyers' requirements and quotations are as under: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5¼d. to 5¾d. per gallon; all *ex* works in bulk.

**Cresylic acid.**—Best grades are in good demand but ordinary qualities are decidedly dull. The following prices can be taken as about average: Pale, 97/99%, 2s. 1d. to 2s. 3d. per gallon; dark, 97/99%, 1s. 10d. to 2s. per gallon; pale, 99/100%, 2s. 6d. to 2s. 9d. per gallon; all *ex* works in buyers' packages.

**Crude naphtha** is only available in small quantities and commands about 7d. to 7½d. per gallon *ex* works in bulk, according to quality.

**Solvent naphtha.**—90/160 grade is 1s. 8d. to 1s. 9d. per gallon and 90/190 heavy naphtha is about 1s. 4d. to 1s. 5d. per gallon.

**Motor benzole** remains at 1s. 6½d. to 1s. 7d. per gallon.

**Pyridine.**—Prices are nominal with 90/160 grade at 17s. to 18s. per gallon and 90/140 grade at about 19s. to 20s. per gallon.

## Contract Advertised

**Coal.**

Oswestry Gas Light and Coke Company. [p. 650.]

## Trading Results in 1939.

**Vickers, Ltd.**—Final ordinary dividend 6 per cent., making 10 for year to December 31 (same). Net profit £1,226,870 (£1,398,853); carry-forward £480,188 (£321,760).

**General Refractories.**—Net profits, attributable to company £50,084 (£15,089), after following group provisions: Taxation, £50,025 (£17,856); A.R.P. and consolidation expenses £8,502 (nil); depreciation, £41,764 (£40,418). Dividend 5 per cent. (nil); fwd. £54,936 (£25,164).


A.R.P.

PROTECTION OF SANDBAGS.

METRO CREOSOTE EMULSION

METRO COPPER CREOSOTE EMULSION

Both Emulsions conform to the Specification of the Ministry of Home Security Memorandum A.R.P. 279/1939 — 20/10/39, and are available in GREEN at slight additional cost.

SOUTH METROPOLITAN GAS CO.

REGIS HOUSE, KING WILLIAM STREET, E.C.4.

Telephone: AVENUE 2755.

***For every size of works and every class of coal...***

# WEST'S

**CARBONIZING PLANTS**

## GLOVER-WEST VERTICALS

## WESTVERTICAL CHAMBERS

**440 carbonizing plants have been built or are under construction by West's in 24 countries. Working results from a wide variety of gas coals have established the high efficiency and adaptability of the West systems.**

# WEST'S

GAS IMPROVEMENT CO · LTD ·

MILES PLATTING MANCHESTER 10

TELEPHONE—COLLYHURST 2961-2-3-4-5 · TELEGRAMS—STOKER, MANCHESTER

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# GAS STOCKS AND SHARES

Up to the time of writing no official statement has been made regarding the result of the War Loan issue, though the market view is that it has been oversubscribed. Interest in the loan naturally predominated last week, and the volume of business in most markets was smaller in consequence. This, together with some uncertainty over the Finnish peace, caused some reaction in prices, though the falls were not serious and the general tone remained steady. British Funds finished fractionally lower, 2½% Consols closing a ¼ down at 73. Home rails stubbornly maintained their levels and in only a very few instances were quotations a shade below those of a week ago. Apart from a few improvements among the "heavies," industrials were irregular with prices inclining to sag. Oils were neglected while rubber shares declined on a fall in the price of the commodity.

Apart from one rather slack day in the middle of the week, the volume of business in the Gas Market was almost as heavy as during the previous week which it will be remembered was the busiest for a long time past. A number of stocks in the Official List made further progress, and apart from the reaction of 6d. to 17s. 6d. in Gas Light Units and a few ex div. reductions the bulk of the price movements were in an upward direction. Several debenture stocks hardened 5 points and Uxbridge ordinary also closed 5 points higher at par after being marked ex div. on March 11. This stock is a good example of the closeness with which so many gas securities are held as no transactions in it have been recorded since this time a year ago when several parcels changed hands at 125.

With the exception of a rise of 6 points in Newcastle 3½% debenture stock there were no special features on the Provincial Exchanges, while in the Supplementary List a few margins narrowed from 10 to 5 points.

## Official Quotations on the London Stock Exchange

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 1,767,439 | Mch. 11 | 8 | 7 | Alliance & Dublin Ord. ... | 108—118* | -2 |
| 374,000 | Dec. 27 | 4 | 4 | Do. 4 p.c. Deb. ... | 80—90 | ... |
| 877,576 | Nov. 6 | 5 | 5 | Assed. Gas & Water U'd'ts Ord. | 14/6—16/6 | ... |
| 500,000 | " | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 16/6—18/6 | ... |
| 535,545 | " | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 15/—17/— | ... |
| 318,730 | " | 4 | 4 | Do. 4 p.c. Irred. Cum. Pref. | 13/6—15/6 | ... |
| 750,000 | Sept. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 83—88 | ... |
| 560,070 | Feb. 19 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 122—127 | +2 |
| 300,000 | Oct. 9 | 1/9⅜ | 1/4⅜ | Bombay, Ltd. ... ... ... | 20/—22/— | ... |
| 181,915 | Feb. 26 | 9½ | 9½ | Bournemouth Sliding Scale ... | 145—150 | ... |
| 690,526 | " | 7 | 7 | Do. 7 p.c. max. ... | 118—123 | ... |
| 493,960 | " | 6 | 6 | Do. 6 p.c. Pref. ... | 113—118 | ... |
| 50,000 | Dec. 18 | 3 | 3 | Do. 3 p.c. Deb. ... | 70—75 | +2 |
| 362,025 | " | 4 | 4 | Do. 4 p.c. Deb. ... | 90—95 | ... |
| 335,000 | " | 5 | 5 | Do. 5 p.c. Deb. ... | 105—110 | ... |
| 357,900 | Feb. 19 | 7½ | 6⅔ | Brighton, &c., 6 p.c. Con. ... | 103—108 | ... |
| 469,955 | " | 6⅔ | 5⅞ | Do. 5 p.c. Con. ... | 100—105 | ... |
| 205,500 | " | 6 | 6 | Do. 6 p.c. 'B' Pref. ... | 103—108 | ... |
| 855,000 | Mch. 11 | 7 | 8 | British Ord. ... ... ... | 102—107* | -½ |
| 100,000 | Dec. 18 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 120—125 | ... |
| 350,000 | " | 5½ | 5½ | Do. 5½ p.c. 'B' Cum. Pref. | 112—117 | +1 |
| 120,000 | " | 4 | 4 | Do. 4 p.c. Red. Deb. | 73—78 | ... |
| 450,000 | " | 5 | 5 | Do. 5 p.c. Red. Deb. | 98—103 | ... |
| 100,000 | 22 May '33 | 6 | 4 | Cape Town, Ltd. ... ... | ¼—¾ | ... |
| 100,000 | 6 Nov. '33 | 4½ | 4½ | Do. 4½ p.c. Pref. ... ... | ¼—¾ | ... |
| 150,000 | Dec. 18 | 4½ | 4½ | Do. 4½ p.c. Deb. ... ... | 55—65 | ... |
| 626,860 | Jan. 29 | 6 | 5 5/10 | Cardiff Con. Ord. ... ... | 103—108 | ... |
| 237,860 | Dec. 18 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 95—100 | ... |
| 98,936 | Oct. 9 | 2/— | 2/— | Colombo Ord. ... ... ... | 1¼—1½ | ... |
| 24,510 | " | 1/4⅝ | 1/4⅝ | Do. 7 p.c. Pref. ... ... | 20/6—22/6 | ... |
| 739,453 | Sept. 27 | -/11.48 | -/11.48 | Colonial Gas Assn. Ltd. Ord. ... | 15/—17/— | ... |
| 296,144 | " | 1/3.30 | 1/3.30 | Do. 8 p.c. Pref. ... ... | 20/6—22/6 | ... |
| 1,775,005 | Jan. 29 | 4 | 2 | Commercial Ord. ... ... | 47—52 | +1 |
| 140,000 | Feb. 19 | 4 | 4 | Do. 4 p.c. Red. Pref. ... | 87—92 | ... |
| 620,000 | Dec. 11 | 3 | 3 | Do. 3 p.c. Deb. ... ... | 62—67 | +1 |
| 286,344 | Feb. 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 95—100 | +5 |
| 200,000 | " | 3⅜ | 3⅜ | Do. 3⅜ p.c. Red. Deb. ... | 93—98 | ... |
| 807,560 | Feb. 12 | 7 | 7 | Croydon sliding scale ... ... | 98—103 | ... |
| 644,590 | " | 5 | 5 | Do. max. div. ... ... | 83—88 | ... |
| 620,385 | Dec. 27 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 100—105 | ... |
| 208 660 | Feb. 19 | 5 | 5 | Dudley, Brierley Hill & Dist. Ord. | 98—103 | ... |
| 82,275 | " | 5 | 5 | Do. 5 p.c. Con. Pref. ... | 93—98 | ... |
| 79,000 | " | 3⅜ | 3⅜ | Do. 3⅜ p.c. Red. Deb. ... | 93—98 | ... |
| 239,000 | Jan. 29 | 5 | 88/6 | East Hull Ord. 5 p.c. ... ... | 80—90 | ... |
| 187,215 | Feb. 12 | 5⅜ | 5⅜ | East Surrey Ord. 5 p.c. ... | 93—98 | ... |
| 176,211 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... | 90—100 | ... |
| 250,000 | Nov. 13 | 8 | 4 | Gas Consolidation Ord. 'B' ... | 14/—17/— | ... |
| 250,000 | " | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 16/—18/— | ... |
| 19,152,410 | Jan. 29 | 5⅜ | 3⅜ | Gas Light & Coke Ord. ... | 17/—18/-a | -/6 |
| 2,600,000 | " | 3½ | 3½ | Do. 3½ p.c. max. ... ... | 62—67 | +2 |
| 4,477,106 | " | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 85—90 | ... |
| 2,993,000 | Jan. 2 | 3⅜ | 3⅜ | Do. 3⅜ p.c. Red. Pref. ... | 87—92 | ... |
| 8,602,497 | Nov. 27 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 77—82 | ... |
| 3,642,770 | " | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 105—110 | ... |
| 9,500,000 | " | 4½ | 4½ | Do. 4½ p.c. Red. Deb. ... | 102—107 | ... |
| 700,000 | Mch. 11 | 3½ | 3½ | Do. 3½ p.c. Red. Ded. ... | 87—92* | -1 |
| 270,466 | Feb. 19 | 6 | 6 | Harrogate New Cons. ... ... | 93—98 | ... |
| 157,500 | Mar. 20 | ‡1/— | ‡1/— | Hong Kong and China Ord. ... | ½—¾ | ... |
| 2,600,000 | Oct. 23 | 12 | 4 | Imperial Continental Cap. ... | 80—85 | ... |
| 172,810 | Jan. 29 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 80—85 | ... |
| 63,480 | Dec. 18 | 3 | 3 | Maidstone 3 p.c. Deb. ... ... | 55—60 | ... |
| 45,000 | | †10 | †8 | Malta & Mediterranean ... | 92—102 | ... |
| | | | | Metropolitan (of Melbourne) ... | | |
| 392,000 | Oct. 2 | 5½ | 5½ | 5½ p.c. Red. Deb. ... ... | 95—100 | ... |
| 231,977 | Feb. 19 | 5 | 5 | M.S. Utility 'C' Cons. ... ... | 75—80 | ... |
| 368,658 | " | 4 | 4 | Do. 4 p.c. Cons. Pref. ... | 82—87 | ... |
| 390,076 | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. ... | 85—90 | ... |

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 148,955 | Dec. 18 | 5 | 5 | M.S. Utility 5 p.c. Deb. ... | 102—107 | ... |
| 125,000 | Jan. 2 | 3½ | 3½ | Do. 3½ p.c. Red. Bds. ... | 90—95 | ... |
| 675,000 | Nov. 6 | †3 | †4 | Montevideo, Ltd. ... ... | 55—60 | ... |
| 250,000 | Aug. 21 | 7½ | 7½ | North Middlesex 6 p.c. Con. ... | 105—110 | -2½ |
| 396,160 | Jan. 29 | 5 | 5 | Northampton 5 p.c. max. ... | 90—95 | ... |
| 300,000 | Nov. 6 | †7 | 9 | Oriental, Ltd. ... ... ... | 118—123 | ... |
| 468,537 | Dec. 11 | 8 | 7 | Plymouth & Stonehouse 5 p.c. | 114—119 | ... |
| 621,667 | Feb. 5 | 8½ | 8½ | Portsmouth & Gosport Cons. | 110—115 | ... |
| 241,446 | " | 5 | 5 | Do. 5 p.c. max. ... ... | 85—90 | ... |
| 73,350 | " | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | ... |
| 75,000 | " | 4 | 4 | Do. 4 p.c. Pref. ... ... | 75—80 | ... |
| 114,000 | Feb. 5 | 5 | 5 | Preston 5 p.c. Pref. ... ... | 88—93 | ... |
| 247,966 | Dec. 18 | 4 | 4 | Primitiva 4 p.c. Cons. Deb. ... | 93—98 | ... |
| 625,959 | Jan. 15 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 91—96 | ... |
| 15,000 | Mch. 11 | 6 | 6 | San Paulo 6 p.c. Cum. Pref. ... | 7¼—8½* | -¼ |
| 441,275 | Oct. 9 | 1/1½ | 1/1½ | Severn Val. Gas Cor. Ld. Ord. | 17/——19/— | ... |
| 460,810 | Mch. 11 | -/10½ | -/10½ | " " 4½ p.c. Cum. Pref. ... | 16/6—18/6* | -/6 |
| 133,201 | Feb. 12 | 8½ | 5 | Shrewsbury 5 p.c. Ord. ... | 105—115 | ... |
| 9,000 | June 5 | ‡4 | ‡4 | South African Ord. ... ... | 4—5 | |
| 1,996,297 | Aug. 21 | 1/2⅜ | 1/2⅜ | South East'n Gas Cn. Ld. Ord. | 16/——18/— | ... |
| 1,000,000 | Mch. 4 | -/10½ | -/10½ | Do. 4½ p.c. Red. Cum. Pref. | 16/6—18/6 | ... |
| 769,191 | " | 4 | 4 | Do. 4 p.c. Cum. Pref. ... | 14/6—16/6 | |
| 150,000 | Feb. 12 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 89—94 | ... |
| 6,709,895 | " | 5 | 4 | South Met. Ord. ... ... | 70—75 | ... |
| 1,135,812 | " | 6 | 6 | Do. 6 p.c. Irred. Pref. ... | 106—111 | +2 |
| 850,000 | " | 4 | 4 | Do. 4 p.c. Irred. Pref. ... | 80—85 | ... |
| 1,895,445 | Dec. 27 | 3 | 3 | Do. 3 p.c. Deb. ... ... | 70—75 | ... |
| 1,000,000 | Jan. 15 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 100—105 | ... |
| 600,000 | " | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 92—97 | ... |
| 1,543,795 | Feb. 5 | 6 | 3 | South Suburban Ord. 5 p.c. ... | 77—82 | +2 |
| 512,925 | " | 5 | 5 | Do. 5 p.c. Pref. ... ... | 95—100 | +2 |
| 500,000 | " | 4 | 4 | Do. 4 p.c. Pref. ... ... | 82—87 | ... |
| 250,000 | " | 3¾ | 3¾ | Do. 3¾ p.c. Red. Pref. ... | 86—91 | ... |
| 888,587 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 103—108 | ... |
| 250,000 | " | 4 | 4 | Do. 4 p.c. Deb. ... ... | 85—90 | ... |
| 200,000 | Feb. 12 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 87—92 | ... |
| 427,859 | Sept. 18 | 1/2⅜ | 9⅜ | S. Western Gas & Water Ord. | 13/6—15/6 | ... |
| 160,523 | Oct. 9 | -/10½ | -/10½ | Do. 4½ p.c. Red. Cum. Pref. | 17/6—19/6 | ... |
| 110,000 | Dec. 18 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 90—95 | ... |
| 750,541 | Feb. 5 | 5 | 5½ | Southampton Ord. 5 p.c. ... | 77—82 | ... |
| 148,836 | Dec. 27 | 4 | 4 | Do. 4 p.c. Deb. | 85—90 | +5 |
| 350,000 | Feb. 12 | 5½ | 5½ | Swansea 5½ p.c. Red. Pref. ... | 97—102 | ... |
| 200,000 | Dec. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—100 | ... |
| 1,076,490 | Feb. 26 | 6½ | 5 | Tottenham and District Ord.... | 93—98 | ... |
| 409,835 | " | 5½ | 5½ | Do. 5½ p.c. Pref. ... ... | 103—108 | +3 |
| 62,235 | " | 5 | 5 | Do. 5 p.c. Pref. ... ... | 95—100 | +2 |
| 453,380 | Dec. 11 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 85—90 | ... |
| 1,247,505 | Oct. 23 | 6 | 4 | U. Kingdom Gas Cor. Ord. ... | 14/——16/— | ... |
| 1,085,952 | Nov. 20 | 4½ | 4½ | Do. 4½ p.c. 1st Cum. Pref. ... | 15/——17/— | ... |
| 772,709 | " | 4 | 4 | Do. 4 p.c. 1st Red. Cum. Pf. | 14/6—16/6 | ... |
| 745,263 | Dec. 18 | 4½ | 4½ | Do. 4½ p.c. 2nd Non-Cum. Pf. | 13/——15/— | ... |
| 1,093,656 | Sept. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 85—90 | ... |
| 378,106 | Mch. 11 | 7 | 7 | Uxbridge, &c., 5 p.c. ... ... | 95—105* | +5 |
| 133,010 | " | 5 | 5 | Do. 5 p.c. Pref. ... ... | 95—100* | -2 |
| 1,371,138 | Feb. 5 | 6½ | 3½ | Wandsworth Consolidated ... | 86—91 | ... |
| 2,525,768 | " | 4 | 4 | Do. 4 p.c. Pref. ... ... | 84—89 | +2 |
| 1,343,964 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 103—108 | ... |
| 383,745 | " | 4 | 4 | Do. 4 p.c. Deb. ... ... | 85—90 | ... |
| 400,000 | " | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 90—95 | ... |
| 558,342 | Jan. 29 | 6¼ | 6 | Watford and St. Albans Ord. ... | 95—100 | ... |
| 200,000 | " | 5 | 5 | Do. 5 p.c. Pref. ... ... | 93—98 | ... |
| 200,000 | " | 5½ | 5½ | Do. 5½ p.c. Pref. ... ... | 100—105 | ... |
| 200,000 | " | 4 | 4 | Do. 4 p.c. Rd. Pf. (1973/8) | 85—90 | ... |
| 100,000 | " | 33/4§ | 4 | Do. 4 p.c. Red. Pf. (1959) | 93—98 | ... |
| 200,000 | Dec. 11 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 83—88 | ... |

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

**Supplementary List and Provincial Exchanges overleaf.**

# STOCK AND SHARE LIST—Contd.

## Supplementary List, not Officially Quoted, London

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Nominal Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 202,152 | Sept. 4 | 5 | 5 | Ascot Ord. ... ... | 80—90 | ... |
| 128,182 | Dec. 27 | 5 | 5 | Do. 5 p.c. Pref. ... | 88—93 | ... |
| 31,035 | Mch. 4 | -/9 3/8 | -/9 3/8 | Associated Utilities 4 p.c. Pref. | 15/—17/- | ... |
| 100,000 | Dec. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—95 | ... |
| 17,000 | Feb. 19 | 8 | 8 | Bognor Orig. Ord. 'A' | 102—112 | ... |
| 62,210 | ,, | 8 | 8 | Do. New Add. 'A' | 102—112 | ... |
| 87,160 | ,, | 7 | 7 | Do. New 7 p.c. max. | 95—105 | ... |
| 37,440 | Jaa. 29 | 10 | 10 | Cam. Univ. & Town 10 p.c. max. | 145—155 | ... |
| 135,970 | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 105—115 | ... |
| 39,025 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 80—90 | ... |
| 96,410 | Jan. 29 | 4½ | 4½ | Cardiff 4½ p.c. Pref. ... ... | 90—95 | ... |
| 55,520 | Feb. 19 | 6 | 6 | Colchester 6 p.c. Pref. ... | 95—100 | ... |
| 90,550 | Sept. 18 | 5 | 5 | Do. 5 p.c. Deb. ... | 100—105 | ... |
| 150,000 | Feb. 12 | 4 | 4 | Croydon 4 p.c. Pref. ... ... | 80—85 | ... |
| 130,000 | Dec. 27 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 85—90 | +5 |
| 65,000 | Mch. 4 | 7½ | 6 7/8 | Eastbourne 'A' 5 p.c. ... ... | 105—115 | ... |
| 198,000 | ,, | 6 | 5 5/8 | Do. 'B' 3½ p.c. ... ... | 90—100 | ... |
| 112,312 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | ... |
| 130,000 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 98—103 | +½ |
| 130,500 | Feb. 19 | 7½ | 7½ | Exeter New Ord. (£10) ... | 10—12 | ... |
| 24,000 | Aug. 21 | 8½ | 8½ | Gt. Yarmouth 8½ p.c. max. (£30) | 15—20 | ... |
| 59,400 | ,, | 7½ | 7½ | Do. 7½ p.c. max. (£30) ... | 10—15 | ... |
| 51,160 | Dec. 11 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 102—107 | ... |
| 152,600 | Feb. 26 | 8 | 9 | Guildford Cons. ... ... | 110—120 | ... |
| 54,055 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | ... |
| 68,250 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 90—95 | ... |
| 156,600 | Feb. 19 | 7 | 5 | Hampton Court Cons. ... | 75—85 | ... |
| 86,046 | June 19 | ‡4½ | ‡5 | Holyh'd&N.W.G.&W.Cpn.Ord. | 13/6—15/6 | ... |
| 90,000 | Feb. 12 | 4 | 4 | Lea Bridge 4 p.c. Pref. ... ... | 65—75 | ... |
| 60,030 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... ... | 105—115 | ... |
| 94,876 | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 75—80 | ... |
| 73,620 | Sept. 18 | 8½ | 8½ | Luton Cons. 'A' ... ... ... | 115—125 | ... |
| 187,960 | Feb. 26 | 4 | 5½ | Mid Kent Ord. (£10) ... ... | 7¼—8¼ | ... |
| 230,940 | Feb. 5 | 10 | 10 | Oxford & District Ord. ... | 135—145 | ... |
| 47,112 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 85—90 | ... |
| 50,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 100—105 | ... |
| 126,193 | Oct. 30 | 7½ | 7½ | Peterborough Ord. ... ... | 140—150 | ... |
| 64,990 | Sept. 18 | 7½ | 7 | Redditch Ord. ... ... ... | 100—110 | ... |
| 166,850 | Feb. 19 | 8 | 8 | Romford Ord. ... ... ... | 108—118 | ... |
| 60,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 85—90 | ... |
| 44,000 | Sept. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 97—102 | ... |
| 25,570 | Feb. 12 | 5½ | 5½ | Rugby 5½ p.c. Pref. ... ... | 95—105 | ... |
| 25,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 100—105 | ... |
| 42,750 | De 11 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 103—108 | ... |
| 110,950 | Feb. 26 | 8 | 8 | Ryde Ord. ... ... ... | 100—110 | ... |
| 270,086 | Sept. 4 | 7 | 7 | Slough Ord. ... ... ... | 100—105 | -2½ |
| 21,000 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 92—97 | ... |
| 28,872 | Nov. 6 | 5½ | 5½ | S. Midland Gas Cpn. Ltd. Ord. | 14/—16/- | ... |
| 28,860 | Sept. 18 | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 14/—16/- | ... |
| 127,228 | Feb. 19 | 5 | 7 | Swindon Cons. ... ... ... | 75—80 | ... |
| 60,425 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 92—97 | ... |
| 64,380 | ,, | 5 | 5 | Torquay & Paignton 5 p.c. Pref. | 82—87 | ... |
| 130,000 | Feb. 12 | 5 | 5 | Wakefield Ord. ... ... ... | 85—95 | ... |
| 81,650 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 75—80 | ... |
| 82,000 | Jan. 29 | 6 | 6 | Weymouth Ord. ... ... | 82—87 | ... |
| 273,626 | Feb. 12 | 7 | 7 | Wolverhampton Cons. Ord. ... | 115—125 | ... |
| 98,384 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... ... | 105—115 | ... |
| 160,000 | Dec. 18 | 5½ | 5½ | Do. 5½ p.c. Red. Deb. ... | 100—105 | ... |
| 106,490 | Aug. 21 | 5½ | 5½ | Wrexham Ord ... ... ... | 70—80 | ... |
| 90,000 | Dec. 18 | 5 | 5 | York 5 p.c. Red. Deb. ... ... | 95—100 | ... |
| 133,640 | Feb. 19 | 6 | 6 | Yorktown (Cam.) 5 p.c. Cons. | 82—87 | ... |
| 120,000 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 85—90 | ... |
| 35,000 | Dec. 18 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 103—108 | ... |

## BRISTOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 347,756 | Feb. 12 | 5 | 6 | Bath Cons. ... ... ... | 99—103 | ... |
| 1,667,250 | Feb. 5 | 5 | 5 | Bristol, 5 p.c. max. | 102—104 | ... |
| 120,420 | Dec. 18 | 4 | 4 | Do. 1st 4 p.c. Deb. ... ... | 98—101 | ... |
| 415,250 | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 98—101 | ... |
| 328,790 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 113—116 | ... |
| 274,000 | Feb. 26 | 5 | 5 | Newport (Mon.) Ord.... ... | 91—94 | ... |
| 13,200 | Sept. 4 | 8⅝ | 7 | Pontyp'l Gas & W. 10 p.c. 'A' | 12—13 | ... |
| 13,600 | ,, | 6 | 5 | Do. 7 p.c. 'B' ... ... | 10½—11 | ... |
| 40,000 | ,, | 6 | 5 | Do. 7 p.c. 'C' ... ... | 10½—11 | ... |
| 140,778 | Feb. 12 | 5 | 5 | Weston-super-Mare Cons. ... | 92—96 | ... |
| 64,338 | Dec. 27 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 90—95 | ... |
| 33,340 | ,, | 7½ | 7½ | Do. 7½ p.c. Deb. ... ... | 140—150 | ... |

## LIVERPOOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 157,150 | Feb. 5 | 5 | 6½ | Chester 5 p.c. Ord. ... ... | 98—101 | ... |
| 92,500 | Dec. 18 | 4 | 4 | Do. 4 p.c. Pref. ... ... | 80—84 | ... |
| 36,430 | ,, | 3½ | 3½ | Do. 3½ p.c. Deb. ... ... | 85—88 | ... |
| 41,890 | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 95—99 | ... |
| 2,167,410 | Feb. 19 | 6 | 6 | Liverpool 5 p.c. Ord. ... ... | 103—105 | ... |
| 245,500 | Dec. 18 | 5 | 5 | Do. 5 p.c. Red Pref. ... | 95—100 | ... |
| 306,083 | July 17 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 99—101 | ... |
| 106,280 | Feb. 5 | 10 | 8 | Preston 'A' 10 p.c. ... ... | 171—181 | ... |
| 188,219 | ,, | 7 | 7 | Do. 'B' 7 p.c. ... ... | 123½—133½ | ... |

## NEWCASTLE EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 122,577 | Feb. 19 | 7 | 7 | Blyth 5 p.c. Ord. ... ... | 113—118 | ... |
| 732,000 | Feb. 19 | 4 | 4 | Hartlepool G. & W. Cn. & New | 63½—64½ | ... |
| 2,430,267 | Feb. 5 | 5 | 5 7/40 | Newcastle & Gateshead Con. | 19/9—20/3a | ... |
| 682,856 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 89—91 | ... |
| 776,706 | Dec. 27 | 3½ | 3½ | Do. 3½ p.c. Deb. ... ... | 84—86 | +6 |
| 277,285 | April 24 | 5 | 5 | Do. 5 p.c. Deb. '43 ... | 101—103 | ... |
| 332,351 | Feb. 5 | 6 | 6 | Sunderland 6 p.c. max. ... | 109—111 | ... |

## NOTTINGHAM EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 542,270 | Feb. 12 | 6 | 9 | Derby Con. ... ... ... | 103—108 | ... |
| 55,000 | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 98—103 | ... |
| 20,000 | Dec. 18 | 5 | 5 | Long Eaton 5 p.c. Pref. ... | 9—11 | ... |
| 80,000 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 100—105 | ... |

## SHEFFIELD EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Mch. 15. | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 10,000 | Feb. 19 | 10 | 10 | Great Grimsby 'A' Ord. ... | 170—180 | ... |
| 6,500 | ,, | 10 | 10 | Do. 'B' Ord. ... | 170—180 | ... |
| 79,000 | ,, | 10 | 10 | Do. 'C' Ord. ... | 160—170 | ... |
| 1,806,339 | Feb. 26 | 6½ | 6½ | Sheffield Cons. ... ... ... | 123—125 | ... |
| 95,000 | Jan. 2 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 98—100 | ... |

a The quotation is per £1 of Stock.
* Ex. div. ‡ For year.


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